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Contractors and Engineers Monthly

Vol. 44, No. 1

JANUARY, 1947

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Covering the Field

Work on Bridges

Speedy replacement of a steel truss on a damaged bridge is described on this page. The contractor for a RR bridge moved fast to save his job from floods. See page 33. A \$110,087 contract (page 47) involved a steel bridge over an expressway.

Dam Construction

Rolled-earth dikes were built for river-flood protection. See page 1. Read on page 65 how the crest of Fort Peck Dam was raised about 7 feet.

Highway Grading

Page 1 reports the initial contract of a planned 40-mile cut-off.

To prevent uneven pavement heaving, subgrade soils were well mixed (page 39). Page 52 tells how road grade was raised on selected-gravel fill, as flood protection.

Maine Turnpike

Page 2 reports the design features and financing, and two contractors' grading and drainage work on its 47.4-mile length.

Modern Air Base

The Fairfield-Suisun Army Air Base marks a trend in airport construction. See page 6, and pages 54-55 for pictures.

Laying Concrete Pipe

An article on page 10 tells how a reinforced-concrete pipe culvert for sewage was extended 36 feet under a freeway.

County Road Work

A large snowfall and long season complicated life for this county. See page 21. Powder-dry soils plague a county roadmaster and his organization. Read page 80.

New Bituminous Roads

Read on page 35 how an old highway received a 2-inch bituminous surface. Reconstruction (see page 43) involved grade flattening, a 12-inch sub-base, and a bituminous-macadam pavement.

Tunnel Construction

Key bores have been driven on two new tunnels for the Colorado-Big Thompson irrigation project. Refer to page 57.

Concrete Paving

Special concrete sills were centered under expansion joints to whip pumping. Page 71 features the account.

Eroded Slopes Restored

A dragline cast 70,000 yards of gravel, truck-hauled from a pit, on eroded side slopes of Cape Cod Canal. See page 90.

Concrete Foundation

The use of a steel tower speeded concrete pouring on a 4-story press-building addition, as reported on page 93.

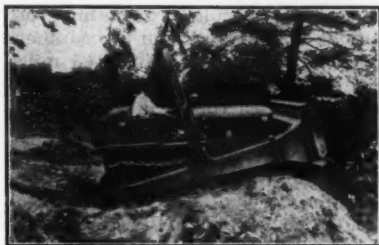
Roadside Development

The new highway program in New York has brought radical changes in slope design and roadside planting, as reviewed on page 96.

Highway Maintenance

Rambling state road crews, which move camp every few weeks, do a typical tar-and-surface treatment described on page 100.

(You will find "In This Issue" on page 4)



C. & E. M. Photo
An Allis-Chalmers HD-7 tractor with a Baker 9-foot dozer blade clears away underbrush at the site of the Nashua, N. H., flood-control dam.

Rolled-Earth Dikes To Control Floods

Protect Mill City From River; Drainage System Built With Pumps for Use In High Water

† THE industrial city of Nashua, N. H., has less cause now to fear a repetition of the great floods of 1936 and 1938; in those years the Merrimack River overflowed its banks, causing considerable damage to the large mills and numerous workers' homes which are located on the west shore. The early part of this year will see the completion of the rolled-earth dikes which are being built along the Merrimack just south of where the Nashua River empties into it after having flowed through the city from west to east.

The construction of flood protection at Nashua is a project of the U. S. Corps of Engineers. It awarded a contract for this work to the Northern Construction Co., Inc., combined with the Lawrence Sand & Stone Co., both of Lawrence, Mass. Six bids were received for the project, ranging from the successful low bid of \$145,764, which was slightly below the engineers' esti-

(Continued on page 75)

Grading and Gravel Surface Start of Big Highway Project

Stage Construction Feature Of Planned 40-Mile Cut-Off; Initial Contract Involves Moving 558,038 Yards

† SCRAPERS moved 558,038 cubic yards of dirt on a 6-mile grading project in south-central Minnesota last summer. This marked the start of a series of projects which illustrate both long-range planning and economical stage construction by the Minnesota State Highway Department. For during the next ten or fifteen years, this series of projects will provide a heavy-traffic cut-off route of two separated 32-foot concrete lanes over more than 40 miles between Faribault and Minneapolis.

The initial contract in the project called for construction and reconstruction over slightly more than 6 miles of

Bridge Disaster Whipped Despite Materials Crisis

By RAYMOND P. DAY,
Western Editor

† HEAVILY loaded, a big truck and trailer roared eastward from Elgin, Utah. On its flat-bed, secured by lashing, rode a big diesel tractor with a heavy-duty bulldozer blade. On the clip board above the driver's seat a weight ticket was pinned. It read 22.4 tons gross.

As the big truck thundered down the long grade of U. S. 50, approaching Green River, it passed a warning sign posted by the Utah State Road Commission which limits gross loads on the Green River Bridge to 12 tons. It sped onto the bridge approach, slowed, and crawled out over the water. The bridge members creaked and groaned as the heavy load rumbled over the floor of the first span.

It happened when the truck passed beyond the pier where the third span reaches from the river towards the west shore. With a brittle roar, as of water dashed on hot grease, the span crumpled at the center pier, and toppled into the muddy river. As the mighty splash subsided and trusswork splattered the water, the massive truck rolled backwards in grotesque slow motion. Turbid brown water closed over the cab.

Seconds later the truck driver's head emerged from the water. He swam towards the shore, clambered slowly up the bank, and made his way to a telephone. The message he sent posed one of the toughest emergency repair problems any state highway department had to face in 1946. The largest bridge on the Green River collapsed; traffic

State Officials Take Personal Charge When Steel Truss Collapses; How Repairs Were Made

halted; lumber and steel for routine maintenance next to impossible to purchase. That was the enormity of the problem.

But fact is always stranger than fiction, so the saying goes, and coincidence has an even longer arm in fact than in fiction. From the very outset, the arm reached into the Green River affair. How else can it be explained that Maurice Housecroft, State Bridge Engineer, was in the very vicinity and arrived at the wrecked bridge 30 minutes after the accident? Housecroft had been making some routine bridge inspections near-by. As a matter of fact, he had already jotted in his notebook the same remark that had been placed on the Green River Bridge reports for years: "Bridge inspected and found unsafe for more than 12 tons."

Housecroft examined the situation, then raced to a telephone in the town of Green River. He placed a call to headquarters in Salt Lake City.

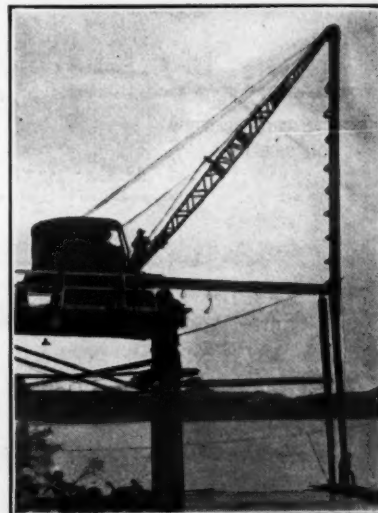
"Well, Roy, it finally happened," he said to the Chief Engineer. "Green River Bridge is gone. The west span folded."

Roy McLeese asked quickly, "Is anyone hurt?"

"No." Housecroft told of the driver's miraculous escape, explained the overload, and gave McLeese the identification on the truck. "Traffic has been barricaded to the east and everything's at a standstill."

"Have we got anything in stock, or is

(Continued on page 14)



Utah State Road Commission Photo
This Bucyrus-Erie 20-B crane was "hi-jacked" from Contractor T. G. Nowland and put to work driving the pile bents for repairing the Green River Bridge.

New 47.4-Mile Toll Turnpike Being Constructed by Authority

Four-Lane Divided Road Has No Grade Crossings Or Stop Lights; Includes Latest Design Practices

By William H. Quirk,
Eastern Editor

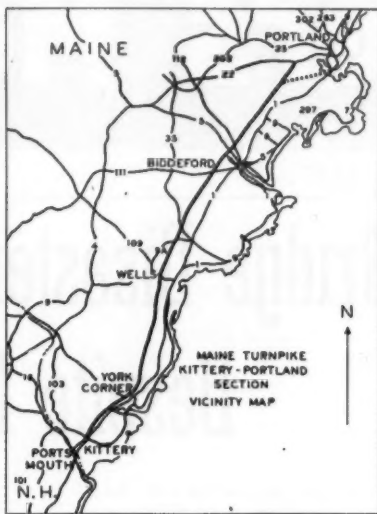
★ ONE of the most modern express highways to be found anywhere in the country is now under construction between Kittery and Portland along the southern coast of Maine. Known as the Maine Turnpike, this new road is being financed entirely by private capital which will be repaid by revenue obtained from toll charges. The highway was conceived to relieve congestion on U. S. 1, chief traffic artery between Boston and Portland; it lies parallel to and west of the Federal route. The Maine Turnpike Authority, which is building the road, was created by the Maine Legislature of 1941; it was given powers to finance, construct, and operate the highway.

The Turnpike will have two 24-foot pavements carrying two lanes of traffic in each direction; the pavements will be separated by a 26-foot dividing strip including inside shoulders. The latest practices in highway design are incorporated in this expressway, which will have no crossroads or traffic signals for its entire 47.4-mile length. It will cost around \$15,000,000. The road will be opened by the autumn of 1947 after two seasons of construction.

Financing the Maine Turnpike

The bonds issued by the Maine Turnpike Authority will not be a state debt nor a pledge of the state in any way. The \$15,000,000 worth of bonds to finance the highway were offered for subscription in February, 1946, at 99½. They are to mature in 1976 at an interest rate of 2½ per cent, one of the lowest ever obtained for this kind of construction financing. The offering was oversubscribed immediately, with the price going up to 101 bid. To pay off the interest and principal of the bonds as they fall due, the Authority plans to charge tolls of 50 cents for passenger cars and \$1.25 for trucks.

A right-of-way 300 feet wide totaling 1,800 acres was obtained by the Authority in new location from ½ to 2 miles west of U. S. 1. This area will be en-



closed within 100 miles of woven-wire fence 4 feet high. The Authority was empowered to acquire such real property by condemnation, but it experienced no difficulty in securing the necessary land.

The southern terminal of the Turnpike at Kittery makes direct connection to a four-lane dual highway. This highway leads south to the recently constructed Maine-New Hampshire Interstate toll bridge across the Piscataqua River into Portsmouth, N. H. Vehicular traffic entering southern Maine from New Hampshire crosses the river either on this toll structure or the old free bridge, so the Turnpike will tap all northbound traffic. At the northern end a connection provides direct access to the business district of Portland and South Portland; it leaves the Turnpike about 2 miles south of where the present construction terminates at Congress Street on the outskirts of Portland.

In 1945 the Maine Turnpike Authority entered into a contract with Howard, Needles, Tammen & Bergendoff, Consulting Engineers with headquarters in Kansas City and New York. The firm designed the Turnpike and is supervising its construction, which will meet the Design Standards of Interstate Highways adopted by the American Association of State Highway Officials on August 1, 1945. These standards are a set of values or controls. Their use is intended to produce highway facilities

(Continued on page 17)

Two Contractors Grade and Drain Project, Using Big Equipment Fleet to Move 4,417,000 Cubic Yards

★ IN preparing contracts to cover the earth work and drainage structures on the Main Turnpike, the Authority divided the 47.4-mile project into four sections for bidding. The two southern adjoining sections, totaling 23.5 miles, were awarded to the Savin Construction Co. of East Hartford, Conn., on its low bids totaling \$2,460,109. The two remaining northern sections, 23.9 miles long, were awarded to the Lane Construction Corp. of Meriden, Conn., on bids which totaled \$1,791,727.50. The four contracts came to a total of \$4,251,836.50.

Actually the Savin Construction Co. was low bidder on the three sections starting at the south end. But it withdrew one of its bids to confine its activities to the southern half, and the Lane Construction Corp., second lowest bidder, got the job. Savin later sublet 5 miles at the lower end of its two contracts to H. D. Maselli Corp. of Bloomfield, Conn.

This grading and drainage work is chiefly an equipment job with excavation the big item. It attracted bids from some of the largest New England contractors, including B. Perini & Sons, Inc., and Carlo Bianchi & Co., both of Framingham, Mass.; V. Barletta Co. of Roslindale, Mass.; and Central Construction Co. of Lawrence, Mass. Both of the successful low bidders started operations the middle of May, 1946. While they have until April, 1947, to finish, the bulk of their work was completed by this winter.

A Borrow Job

The project includes 300 concrete culverts up to a double 8 x 8-foot size. However, the chief feature of the job is the excavation which totals 4,417,000 cubic yards. It is not that there are spectacularly deep cuts or high fills. This strip of ground a few miles back from the Maine coast is rolling country with gentle hills and valleys; in fact, the deepest cut averages 25 feet and the highest embankment is 41 feet, and these are only for fairly short distances. However, with the wide 94-foot roadway section and deep ditches, together



C. & E. M. Photo

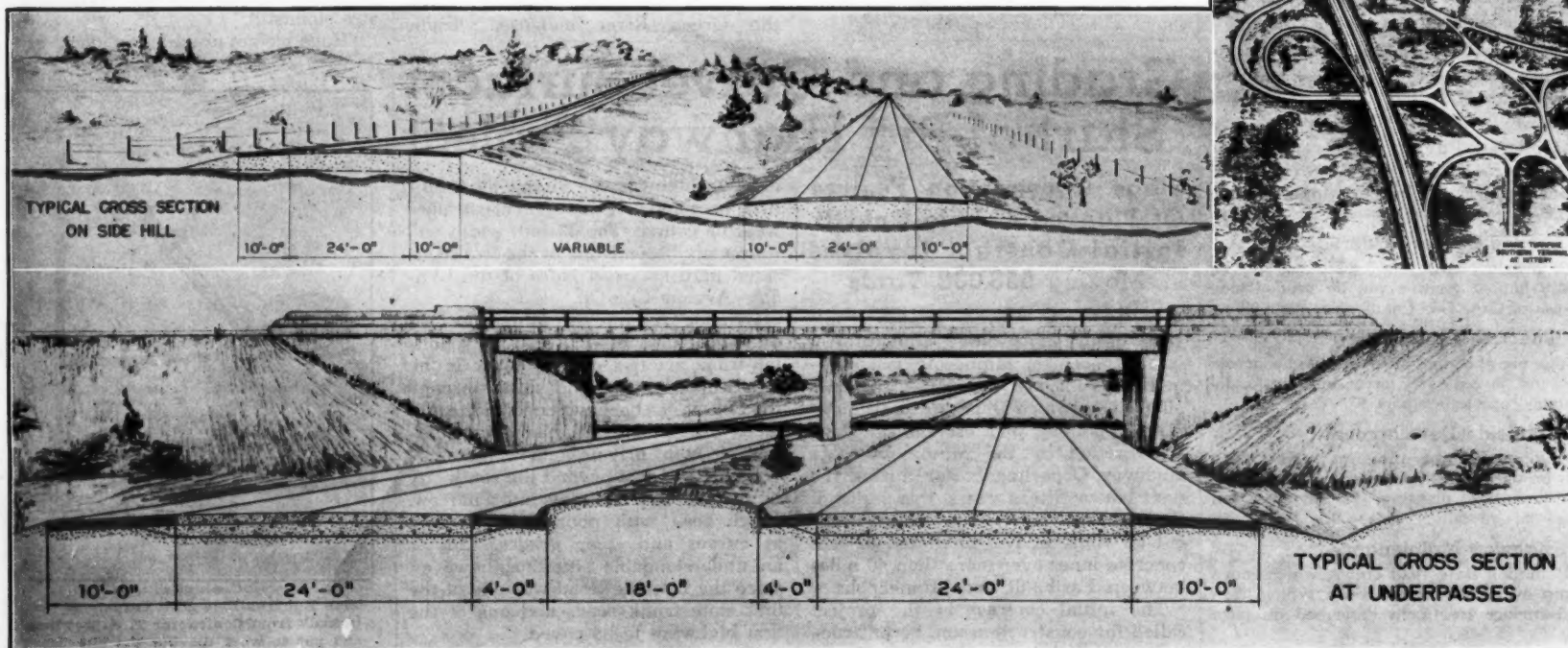
Muck from a deep ravine is excavated by a Link-Belt Speeder crane and 1½-yard clamshell. It is then hauled away in Mack trucks.

with the high design of embankments because of the Maine snowfall, a lot of material had to be excavated over the entire job. Consequently the job was predominantly borrow, both for the earth embankments and for the permeable foundation.

Here the Maine Turnpike Authority and the consulting engineers, Howard, Needles, Tammen & Bergendoff, who are designing and supervising the project, did an unusual thing on jobs of this kind. They relieved the contractors of all responsibility in acquiring material both for earth-work borrow and roadway foundation.

Geologic surveys were made and a map drawn to indicate the location of sand and gravel deposits along the length of the Turnpike for a width of 4 miles. Even before the contractors arrived on the job, these areas were put under options. By these options the owner agreed to sell the material, not

(Continued on page 87)





A dense-graded Texaco Asphaltic Concrete pavement, consisting of a 1½-inch binder course and 1-inch wearing surface, laid over worn brick in Greenfield, Mass.

America has laid pavements like these for 40 years



A Texaco Sand Asphalt pavement constructed five years ago over worn concrete on State Highway No. 17 in Norfolk County, Va.

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Standardize the Spex

Contractors whose work spreads over many states would welcome a standardization of state highway specifications. Highway departments, also, would benefit from such standardization: their construction costs would decrease, because lower bids would be made possible by more uniform rulings and more specific interpretations as to how a contract should be carried out.

Such standardization might well begin with the earth-work item, the preliminary step in road building. For instance, wide differences of opinion exist among states on the subject of soil compaction. As a result, the contractor must constantly adjust his equipment and methods to conform to the many different specifications.

One state, as an example, specifies that each lift of a fill must be rolled until no further compaction is necessary. Unlimited powers of interpretation are thus placed in the hands of the state's representative on the job, who may or may not be competent to judge when a fill has been rolled sufficiently. And with a literal-minded resident engineer or inspector supervising the earth work, a contractor may well find himself spending far more time and money on compaction than he had anticipated.

If the specifications simply stipulated that a lift should be rolled by a minimum number of passes of a specific piece of equipment having a certain weight, then much of the guesswork could be eliminated from the contractor's bidding. Should additional rolling be required because of certain localized conditions, then this extra work could be paid for as a separate item.

The confusion which results from different interpretations of specifications is illustrated by the following case. A contractor recently passed up a bid on a highway grading job. It appeared to him on reading the specifications that two different types of rollers would be required to compact a fill. The successful bidder thought the specifications could be met with a single type of roller, and he provided that equipment only. Unfortunately for him, the state inspectors did expect the fills to be rolled with two kinds of rollers. As a result, the project was marked by needless wrangling between the contractor and the state engineers as to which method of compaction would produce the more favorable results.

Specifications which are too general, and so open the door to personal interpretation and opinion, recently played havoc at a western airport. The use of an ordinary scarifier in preliminary earth processing was apparently justified. But density results averaged only 92 per cent for the first five months of the job. After five months of bickering, quarreling, and near-hair-pulling between the superintendent and the engineer, the superintendent went to the

trouble to purchase a new pulverizing and blending machine. Densities rose immediately to 98.5 per cent with less rolling. Had the specifications been written more definitely, a five-month production of bad embankment—which the contracting agency had to accept—would have been averted.

Moisture-blending specifications are so diverse they are frequently harmful. General phrasing usually produces the opposite of uniformity in results, and a contracting agency which indulges in that lazy practice is almost certain to end up on the short end of the density sheets.

Where the subject of moisture content is introduced into specifications, contractors become wary. They do not know how long they may be held up in placing fills while they wait for the soil to dry; and delays, with equipment standing about, represent an irretrievable loss to them. In the case of airports, dams, or levees, this condition is not too serious, for earth-moving equipment can generally be shifted quickly from section to section to place a lift of fill over a large area. With highways, however, there is less flexibility of operations.

There the working space is narrow. When a cut has been made and placed on a fill to dry, the contractor must either stand by with the equipment or move it, perhaps a considerable distance and at great cost, to the next cut.

This situation is fairly common in deep cuts, which often dry out on top but remain wet underneath until aerated or spread out in a shallow layer on the fill. Until a cheap effective way of drying out soils is possible, the contractor's problem of placing wet fills should be considered in the specifications for the project.

Consideration of the earth-work item should be just the beginning. There are many more instances where standardization would, in the long run, reduce costs and speed construction operations. A step towards standardization could be made if the subject were discussed at various regional meetings of state highway officials, and later before national gatherings of contractors and engineers, both Federal, state, and county.

Reduced Dollar Adds To Highway Problems

The problems of state highway officials in meeting post-war construction needs were discussed by M. J. Hoffmann, Minnesota Commissioner of Highways, and President, American Association of State Highway Officials. He spoke before a meeting of the Construction Industry Advisory Council of the U. S. Chamber of Commerce in Washington, D. C.

Mr. Hoffmann pointed out that while highway needs have been greatly increased by the wartime moratorium on construction, highway officials have been in a dilemma. If they awarded contracts at post-war prices which might be construed as excessive, they would be subject to criticism. They would also be subject to it if they did not start on the badly needed road construction.

According to Mr. Hoffmann, highway authorities have pretty much followed a middle course, adjusting their programs to meet the unusual conditions. Bids at the start were solicited on a limited number of projects on which it was believed that reasonable bids might be obtained. From January 1 to October 31, 1946, construction contracts were awarded for a total of about \$450,000,000 for projects involving Federal funds, or Federal and state funds on a 50-50 basis. The 1946 program, reckoned in dollars, reached approximately the pre-war level. Actual accomplishments, however, have been reduced by the shrinking dollar.

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Mr. Hoffmann pointed out that a start has been made. But only about one-third of the \$1,000,000,000 of Federal funds apportioned for the two fiscal years after the war will be committed to approved projects. Highway construction is running far behind the schedule contemplated when Congress passed the Federal Aid Highway Act of 1944.

He stated that highway officials do not believe they can postpone all highway improvements until they have a return of pre-war unit prices. Nor do they subscribe to the theory that all public-works construction should be regulated according to economic conditions—enlarged to take up the slack during periods of unemployment, reduced when employment is high. Any such proposal, he contended, misses completely the real purpose of highway improvement, which is to provide the physical facilities necessary for safe and efficient transportation.

Mr. Hoffmann reminded his listeners that the justification for the road program is the vital role which highway communications necessarily must play in our national economy. Readiness of our highway system to serve transportation needs must not be jeopardized by linking our road-improvement plans with unemployment-relief programs as such.

Roadside Development Course February 13-14

The date has been set for the Sixth Annual Short Course on Roadside Development, jointly sponsored by Ohio State University and the Ohio Department of Highways. This year the course will be held on February 13 and 14 in the Auditorium of the Ohio Departments of State Building, 65 So. Front St., Columbus, instead of at the University as usual. Crowded conditions on the campus have made this change necessary. The committee suggests that hotel reservations be made as far in advance as possible.

Speakers will present topics of general interest to engineers, landscape architects, the lay public, and educational personnel. In addition, inspection trips have been planned for the Saturday and Sunday following the meeting.

Further details may be obtained from Charles R. Sutton, Landscape Architect, Department of Architecture and Landscape Architecture, Brown Hall, Ohio State University, Columbus 10, Ohio, or Dallas D. Dupre, Jr., Landscape Architect, Department of Highways, Columbus 15, Ohio.

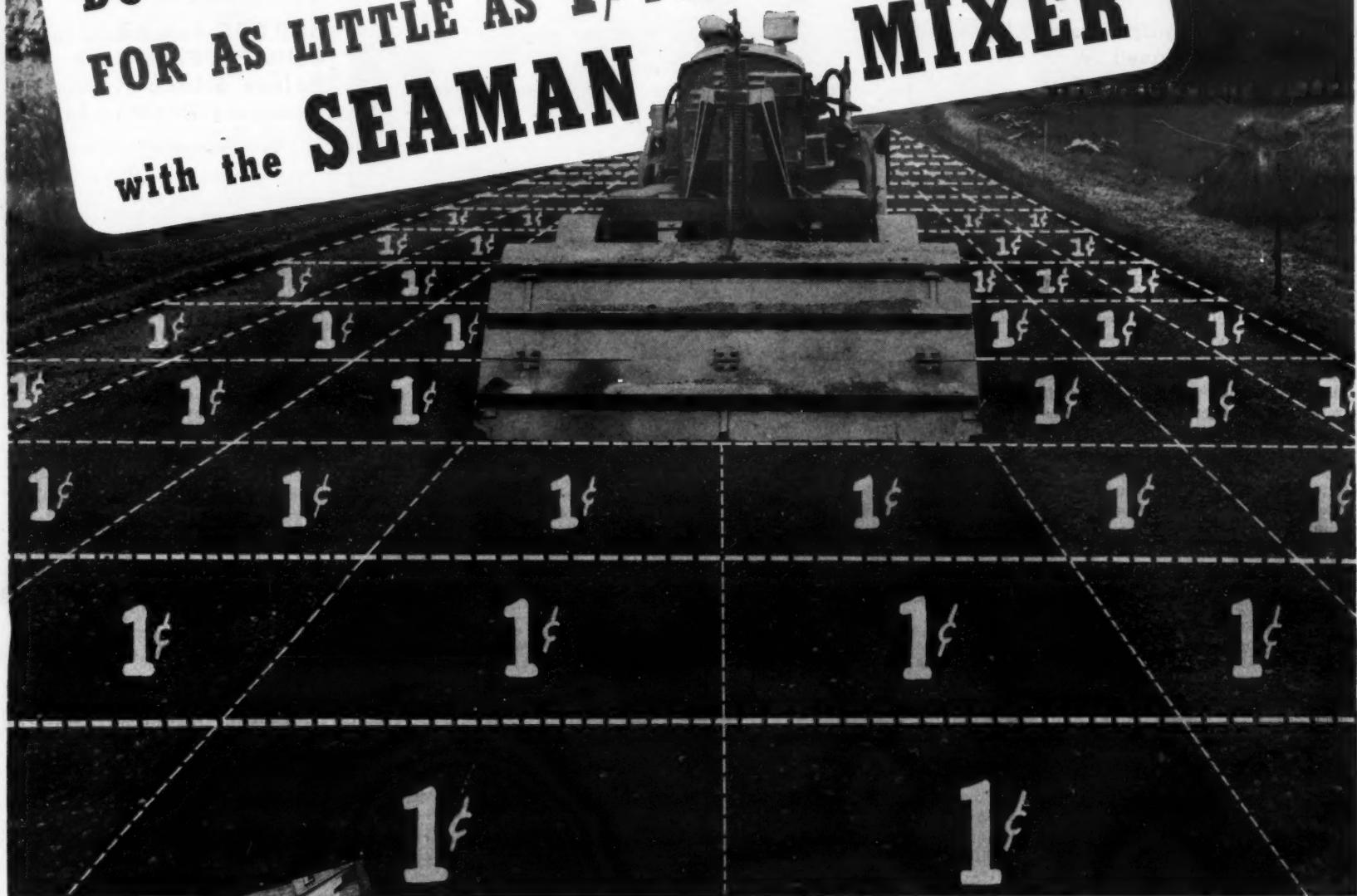
Help the Hungry

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Air Terminal of the Future Paved for Heavy Sky Giants

Taxiways, Warm-Up Apron, Loading Area Paved With Concrete 18 to 27 Inches Thick; New Trend Seen

(See photos on pages 54 and 55)

★ WHEN the world's greatest airplanes are built, probably to gross weights of something like 300,000 pounds or more, where will they land? The Air Transport Command and the Army Corps of Engineers say that Fairfield-Suisun Army Air Base, in California, constructed by Morrison-Knudsen Co., Inc., and Stolte, Inc., is the country's most futuristic military air terminal. They say it will take anything that flies, and, for that matter, anything that is now on the drawing boards for the foreseeable future.

It was planned originally, while war still raged with Japan, as a major jump-off point for ATC's giant cargo and passenger planes which fly various routes to the Orient. Now that this great air base is finished, the Army will have a landing place for its heaviest planes. The field is also designed for short taxiing from loading points to the start of the main runways; this will make things much easier for the mammoth planes on the ground. It is going to be a "fast" terminal, one that pilots will like to make.

The trend in airport design now points up the necessity for great strength under heavily loaded planes, while they stand with four or possibly more engines turning over as they warm up. Airfields all over the country and overseas have failed when C-54's or B-29's stood in a parking apron and shook the ground for hundreds of feet around it.

When the Sacramento District of the Army Engineers designed this terminal, its engineers concentrated all possible strength to resist this force in the parking apron, in four concrete taxiways, and in the first 2,150 feet of the runway. The finished design called for Class A concrete 18 inches thick increasing to 27 inches at the edges, placed on a compacted subgrade with select crushed stone between the subgrade and concrete. The remaining portion of the 8,000-foot runway was constructed of a crushed-rock base and a 6-inch asphaltic-concrete surface course.

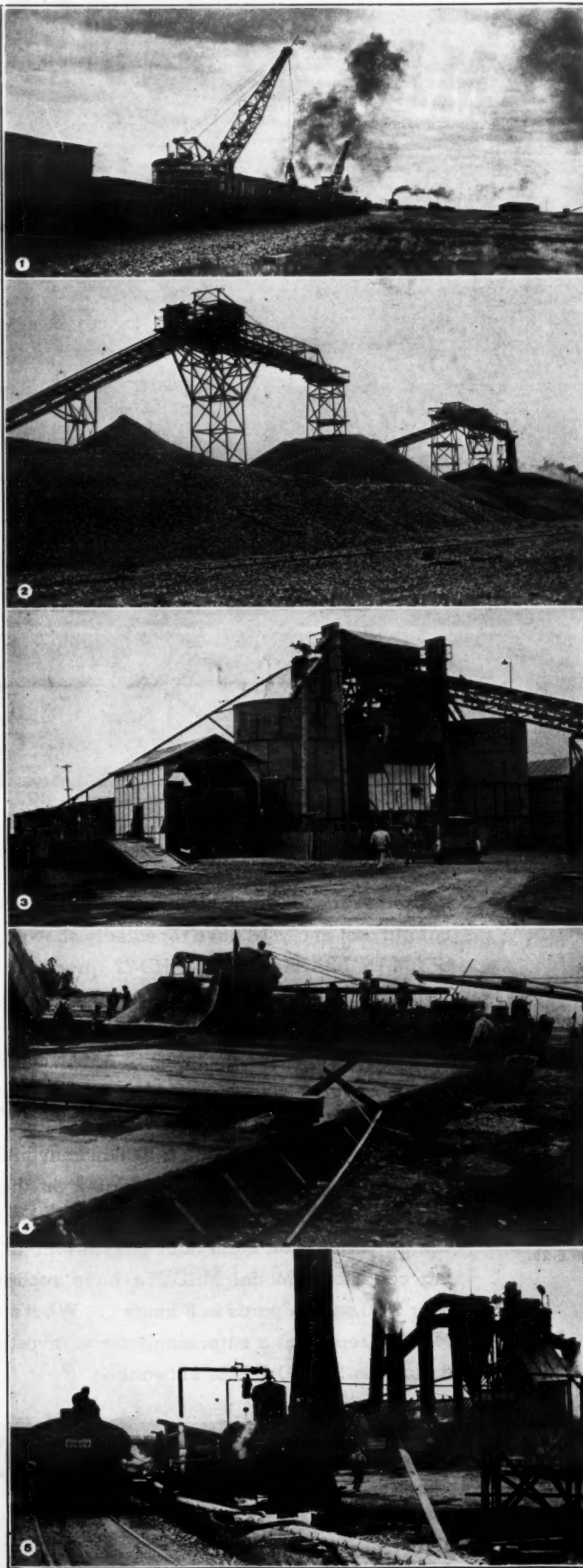
Morrison-Knudsen and Stolte, Inc., had the Fairfield-Suisun work, operating jointly, under a negotiated unit-bid contract. The portion of the work including the runway, taxiways, parking apron, utilities, roads, streets, and railroads was done by Morrison-Knudsen's personnel and equipment, under the direction of General Superintendent A. H. Johnson.

Concrete Batching Plant

In order to handle the great volume of construction materials at Fairfield-Suisun, the contractors built about 10 miles of temporary-construction railroad. Four locomotives were required to haul the cars. The batching plant for concrete and bulk cement was set up along this railroad, as all concrete materials had to be brought in by rail.

The batching set-up consisted of two Noble plants, each holding 80 tons, set side by side. Each plant had four 20-ton bins. From 25 to 100 railroad cars of aggregate (bottom-dump cars when possible) came in each day. They were dumped to two hoppers provided with a mechanical feeder to load two 36-inch

(Continued on page 23)



300,000-Pound "Gismo" Rolls 5½-Foot Rock Base Before 6-Inch Asphaltic-Concrete Runway Is Laid

(See photos on pages 54 and 55)

The fluctuation of air currents a few degrees from the prevailing wind direction is having less and less effect on heavy airplanes. The old Fairfield-Suisun runway was 8,000 feet long, with 1,000-foot clear zones of compacted earth at both ends. Because of the negligible effect of shifting wind, and also because elaborate navigation and landing aids have been installed at this advanced field, the new runway was staggered parallel to and 1,000 feet over from the runway now existing.

Of all the unusual load-testing devices ever tried on select base courses, perhaps the most severe is "Gismo". Gismo is a machine. It is a nondescript-looking piece of equipment on six rubber tires, conceived by the U. S. Engineers, built by Peterson Equipment Co., ballasted by iron weights, and weighing 300,000 pounds. Gismo throws weight around to better purpose than a second lieutenant.

It takes a Caterpillar D8 or the equivalent to handle Gismo. And when it finished rolling a piece of select base at Fairfield-Suisun, surveyors occasionally had to use a jackhammer to drill a hole in which to set a survey hub. While there are those who scoff at Gismo and swear its past publicity is overrated, they still can't get away from the fact that the new main runway at Fairfield-Suisun took 300,000-pound rubber-tired loads repeatedly before the asphaltic-concrete surfacing was laid.

Base-Course Methods

Crushed rock which would pass a 3-inch square mesh was hauled in over the railroad from two commercial aggregate suppliers. Long lines of railroad cars filled with rock were spotted on a siding, where two Northwest 80 and two Northwest 80-D clamshell rigs were waiting to unload. The Northwest machines bailed crushed rock into a fleet of bottom-dump Euclids, which hauled about a mile to the center of the work. Dumped in thin lifts, rock was then leveled off to an uncompacted thickness of about 6 inches by Caterpillar motor graders. Hauling conditions between the railroad siding and the job were level and, generally speaking, dry.

After being leveled by motor graders, the rock was sprayed by Euclid 4,600-gallon-water-tank tractors, equipped with pressure pumps. About 30 gallons of salt water per cubic yard of rock was applied in dry weather, prior to rolling. It came from Suisun Bay, 3½ miles distant, through a 10-inch pipe line and was relayed to the hauling units through a reservoir. Tamping was done by a fleet of 3-wheel 10-ton smooth rollers.

(Continued on next page)

C. & E. M. Photos

Base-course rock and aggregate for both concrete and bituminous paving at the Fairfield-Suisun Army Air Base were hauled in over a railroad. 1. Here two of Morrison-Knudsen's Northwest 2½-yard clamshells unload rock for base course. 2. Aggregate from the railroad cars was stockpiled; then transferred to the batching plant by belt conveyor. 3. Two Noble plants, set side by side and each holding 80 tons, handled the batching for the concrete paving. 4. Workmen set the dummy contraction joints. Two 34-E pavers were used on the 25-foot slabs. 5. Asphalt is delivered to one of the two 20,000-gallon storage tanks which supplied the Standard Steel Corp. hot-mix plant.

Runway Is Designed To Carry Heavy Loads

(Continued from preceding page)

You could see Hubers, Galions, and Austin-Westerns working. They rolled and rolled until the rock would no longer consolidate, and then after every 18 inches of this treatment they called on Gismo.

The smooth-roller boys ragged the living daylight out of the cat skinner who pulled Gismo. The inference in their jibes was plain, but good-natured—as if Gismo were perhaps some progeny of doubtful parentage. But Gismo received a lot of attention from high officials interested in compaction results. So the roller operators were probably a little envious that Gismo's operator could command so much attention with such an ungainly-looking piece of equipment.

At any rate, Gismo performed on every 18 inches of fill. And Government technicians who dug holes after the performance, to take density samples, had no easy job. The surveyors who set hubs behind Gismo drilled holes with jackhammers, and then set the stakes. The crushed rock had been compacted too much for stake driving. Such was the brute strength of this rock blanket, 66 inches thick from subgrade to pavement. It is the engineer's answer to large dynamic loads. It is one kind of solution to the problem of ponderous ground weight of cargo planes today and ten years from now.

The neat dressing of 3-inch maximum rock with a motor grader is not too practical. So the last 2 inches of this 5½-foot course consisted of minus 1-inch crushed stone. It was bladed smooth, rolled to 100 per cent compaction, and checked by surveyors to closer tolerances than are standard in any state highway department in the nation today for select base. When the work was inspected and pronounced acceptable by the U. S. Engineers, a pressure distributor primed the rock with 0.25 gallon of Standard Oil SC-2 cut-back asphalt per square yard of surface, and the base course was ready for asphaltic concrete.

Strips of runway about 1,000 feet long were treated at a time in this manner, including the base course under 50-foot-wide shoulders along both sides. This prime coat, which penetrated about ¾ to 1 inch below the top surface, was allowed to cure from 2 to 3 days before the hot-mix surfacing was laid. Traffic was permitted on the prime coat after it cured.

Laying Hot Asphaltic Concrete

Air temperatures above 50 degrees and a short haul made it unnecessary to cover hot-mix hauling trucks on a 1-mile run between the hot plant and the field. Six of these trucks, rented by the hour from Baker & Graves, subcontractor, were used the day the job was visited for *CONTRACTORS AND ENGINEERS MONTHLY*, and 1,040 tons were placed. The 5-yard water-level steel bodies on these trucks were cleaned with a steam and diesel fuel jet.

The number of hauling trucks was beautifully balanced. You seldom saw more than two loads waiting to dump, and you seldom saw the spreader stopped. A loaded truck raced down the field, backed in to the Barber-Greene Tamping-Leveling Finisher, and dumped its load gradually into the finisher hopper. Rollers on the finisher, acting on the truck wheels, moved the truck forward until its bed was dumped clean. The truck's gears were shifted to neutral as soon as its tires touched these rollers. A dump man controlled the motions of all truck drivers, by signal, from the time they backed in until he gave them the all-clear signal

to highball back to the asphalt plant.

Guided by a steel pointer on the machine and a string line on the ground, the finisher operator moved forward at a steady rate, his helper checking the thickness of material. A 3½-inch binder course with 2-inch maximum crushed rock was first laid. This course had to be put down about 4½ inches thick to get the required compacted thickness. It was hard on screens at the plant and hard on the Barber-Greene tamping bars, due primarily to the large size of aggregate.

Base binder course was laid down in strips 10 feet wide, working outward from the center line of the runway. The streamlined crew on this job consisted of a finisher operator, a screed man, a raker, a dump man, and two roller operators. The foreman in charge of this gang directed work and set the string line ahead of the finisher.

As soon as the blue smoke stopped rising from the asphalt, it was given a double longitudinal roll by an 8 or 10-ton tandem smooth-wheel Huber or



Gismo is the name of this special compaction unit used on the subgrade at the Fairfield-Suisun Army Air Base. Ballasted with metal, it weighs 300,000 pounds. So great was its pressure that a jackhammer had to be used to drill stake holes in the subgrade.

Galion roller. The longitudinal joint was rolled first. About 3 hours later, the asphaltic concrete received its final compaction when a new Buffalo-Springfield 3-axle tandem 14-ton machine passed over the strip until it would no longer "give". One of the improvements in this new roller is the steering feature on both forward axles,

which permits all ridges to be ironed smooth regardless of the position of the (Continued on next page)

700,000 TONS

...and still going strong!

We've produced 1500 tons per 8-hr. day many times

We've never had a day's shutdown due to repairs

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OPERATING 12 MONTHS out of the year this Madsen Plant, owned and operated by Sparks & Mundo Eng. Co., has turned out 700,000 tons of asphalt-bound material without one day's shutdown due to repairs.

Mr. C. O. Sparks says, "We've produced 1500 tons per day many times during the continuous operation of our Madsen Plant."

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production speeds... and Madsen Plants have the speed, the stability and design to consistently perform at high speed—it has been proved. Learn about all the Madsen-exclusive features which assure faster mixing, sustained production and long life. See for yourself the advantages of the Madsen Asphalt Injection System, High-Speed Sectional Pug Mill, Unit-Power Transmission and many others; write for illustrated catalog.

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★ **C. O. SPARKS** of Sparks & Mundo Eng. Co., is a pioneer in the construction industry in California. His keen insight in asphalt plant operation and his 42 years of experience makes his active participation extremely important in the management of one of the largest businesses of its kind in Los Angeles. Mr. Sparks says, "We've ordered another 4,000-lb. Madsen Asphalt Plant just like the one we are now operating."

★ **35 YEARS** as a contractor, affiliated with the California construction industry since 1911, Mr. W. T. (Bill) Ellington is well known in the West. Bill's practical application of engineering to his company's operation has contributed greatly to the success of Sparks & Mundo Engineering Co. Mr. Ellington says, "We know from experience Madsen Plants will turn out as much as 30,000 tons per month without a single shutdown due to repairs."



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Runway Is Designed To Carry Heavy Loads

(Continued from preceding page)

machine.

Construction joints were formed at right angles by making up a number of wood joints, beveled on one side to allow the roller to climb up or down. The right-angle side was made for the thickness of the course being placed, either 3½ or 2½ inches thick. These joints were placed by the dump man and raker, and loose mix raked up to the top of the board.

When the 3½-inch binder course was finished, it was given a seal coat of emulsified asphalt, applied at the rate of less than 0.1 gallon per square yard.

The placing of 2½ inches of surface course was done in about the same manner as the lower course, with the exception of mix and width of courses. The mix for this top course was finer, with 1-inch maximum material. It had to be laid down 3 inches thick to compact to 2½ inches. The spacing of strips of this surface course commenced at the outside of one shoulder, and five strips were laid down 11 feet wide. Thus the joints were staggered over the runway proper. The same scheme repeated on the other shoulder brought the strips out evenly. The top surface course was continued out over both shoulders, and when it was finished the runway was complete. The final surface of the runway paving consisted of a seal coat and sand screenings passing a No. 16 mesh screen, applied at the rate of about 7 pounds per square yard.

The lateral slope on the new runway is 1½ per cent, and 2 per cent on the shoulders to allow for drainage. About 4,000 linear feet of 10 and 11-foot strip was laid, on an average, in 8 hours.

The Hot-Mix Plant

The Fairfield-Suisun hot-mix plant was originally custom-built in 1942 by Standard Steel Corp. A portable plant, it saw service at the big air base at Kingman in Arizona, and was sent down into Mexico before moving up to Fairfield.

In order to guarantee absolutely that this plant would operate at capacity on this urgent job, certain precautionary measures were taken. They included the feeding of carefully controlled aggregates through adjustable trapdoors in the tunnel to a 36-inch conveyor belt, and dumping the several sizes of crushed rock to the cold elevator in approximately the right proportions for finished work.

The 36-inch conveyor was a piece of belt which had been previously used on a dam job. Driven by a 40-hp G-E motor, this 210-foot belt traveled 410 feet per minute with a designed load of 12 pounds of rock per linear foot of belt at that speed. It secured its load directly through mechanical feeders.

The first of these, known as the fine feeder, carried sand and fine rock at a speed of 50 feet per minute. The second and third, known as the ordinary feeders, carried crushed rock of coarser sizes and traveled 250 feet per minute. All feeders deposited their loads on the main conveyor, and the rock was so regulated by the mechanical feeders in this tunnel that the proper mix was secured. The oversize was rejected when it reached the classifying screens in the hot plant.

The major part of the aggregates for asphaltic concrete came in over the railroad from Pacific Coast Aggregates at Fair Oaks, Calif., and from McGilivray Construction Co. at Sacramento. The rock was unloaded by Northwest 2½-cubic-yard cranes and clamshells, and stockpiled over the 210-foot tunnel in four piles by a bulldozer. About 15,000 tons of each grade of rock could

be stored simultaneously.

The sizes of rock came within the following specified tolerances:

Per Cent Passing	
Large (1 to 2-inch):	
2-inch*	100
1½-inch	20-100
1-inch	0
Intermediate (1-inch to No. 10):	
1-inch	100
¾-inch	74-100
½-inch	58-84
⅜-inch	44-68
No. 4	10-35
No. 10	0
Fines (No. 10 to dust):	
No. 10	75-100
No. 40	27-42
No. 80	10-26
No. 200	5-13

The 3½-inch base course of asphaltic concrete which was a 4-bin pull, was batched out as follows:

Rock Size	Weight in Pounds	Per Cent of Mix
No. 6 to ¾-inch	1,200	40
No. 6 to ½-inch	300	10
¾ to 1¼-inch	600	20
1¼ to 2-inch	900	30
85 to 100-penetration asphalt	120	4
Total Batch Weight	3,120	



C. & E. M. Photo

One of the trucks delivers its 6½-ton load of hot-mix to a Barber-Greene Tamping-Leveling Finisher working on runway paving at the Fairfield-Suisun Army Air Base.

Aggregate from the tunnel moved into the cold elevator, and was sent through a single 72-inch x 26-foot

drier. A 40-foot extended hot elevator then took the rock to a Symons 4 x 12- (Concluded on next page)

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A full load... plus! No more ramming into stock pile. Simply ease SCOOPMOBILE into pile and lift bucket with a FULL load... easier on the machine... faster, fuller!

2 HAND LEVER CONTROL

Two hand levers at operator's fingertips, give positive, flexible control of bucket action. No more trip rope and "shock dumping" from unhandy elevations.

3 DISCHARGE ACTION

Full loads can now be discharged from very top of track. (Up to 8 ft.) Partial loads can be discharged by closing bucket at any height while pouring.

4 NEW COUNTER BALANCE

The new SCOOPMOBILE keeps its feet on the ground! New counter balance (optional) is easy to attach to rear of Scoopmobile to accommodate heavy loads at top of track.

5 CONTROLLED DIGGING ANGLE

Improved double sheaves and mechanical improvements give entirely new control of digging angle. New design of bucket means NO spillage over rough terrain.

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Runway Is Designed To Carry Heavy Loads

(Continued from preceding page)

foot vibrating screen where it was reclassified for four storage bins by the following screens:

Rock for No. 1 bin passed over a vibrating split screen, covered with $\frac{1}{4}$ -inch square-mesh wire and No. 6 square-mesh wire cloth divided equally over both halves of the screen.

Rock for No. 2 bin passed through a single-deck screen covered entirely with $\frac{1}{2}$ -inch mesh over its 4 x 12-foot surface.

Rock for No. 3 bin passed through a single-deck, 4 x 12-foot screen covered with $\frac{1}{4}$ -inch square mesh.

No. 4 storage bin was filled with rock passing a $2\frac{1}{4}$ -inch scalping screen, placed on the top deck. A storage hopper for rejected material, normally a problem on an asphalt plant, received oversize rock.

Standard Oil Co. asphalt, of 85 to 100 penetration, was supplied by Sheldon Oil Co. in tank trucks and trailers. It was unloaded at the plant by the trucks and trailers at a temperature of 320 degrees F into two 20,000-gallon storage tanks buried in the ground. Unloading was done by gravity.

The asphalt heat in the storage tanks was retained by feeding steam through 240 feet of $2\frac{1}{2}$ -inch coils in the tanks. A 90-hp horizontal locomotive-type boiler was used for heating asphalt and operating the reciprocating Fairbanks asphalt pump which fed the material to the pugmill. The size of this asphalt pump was 6 x 4 x 6 inches.

The storage tanks were set horizontally, with their top surface about even with ground level. Asphalt made a continuous loop through asbestos-insulated lines to the pugmill and back to the storage tanks. The lines were equipped with gravity bleeders so that asphalt could be drained back to the storage tanks in case of a shut-down.

A second 90-hp horizontal locomotive-type boiler was used to atomize drier fuel, operate the rams on pugmill and gob-hopper gates, and to furnish steam for the small steam-jacketed asphalt pot. Both boilers had cold-water injectors, and were hooked together so that in case of a shutdown the functions of the boilers could be interchanged.

The steam piping was laid so that all steam worked downhill from the headers. Steam traps were also placed in all coils, so that condensate could be bled. Boilers were fired by Bunker C 18 gravity fuel, which was hauled in and stored in a 10,000-gallon tank. Atomization was done by steam.

Other auxiliary power at the asphalt plant included a 50-hp G-E electric motor which drove a 6-foot fan on the cyclone unit for dust and fines recovery. The main plant, including hot and cold elevators, drier, vibrating screens, and all interconnections, was driven through a flat belt by a Cummins Model L-1 diesel engine, rated at 190 hp.

The asphalt was weighed at the asphalt pot instead of metered. Aggregates were weighed on Kron dial scales. Then 3,000-pound batches, with 4 per cent asphalt for the base course or 4.6 per cent for the surface course added, were put out to the waiting trucks, which hauled about $6\frac{1}{2}$ tons.

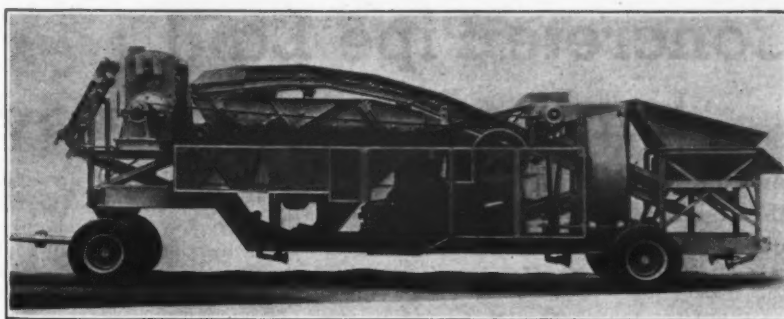
Portable Gravel Plant

A new, small portable crushing and screening plant called the Pitmaster Straightline has recently been announced by the Iowa Mfg. Co., Cedar Rapids, Iowa. The primary crusher is a 10 x 16-inch roller-bearing jaw crusher and the secondary is a 16 x 16-

inch roller-bearing roll crusher. Conveyors are all ball-bearing channel-frame type for light weight.

An elevating-wheel return system makes the Pitmaster short and narrow, and is said to speed handling of the crushed oversize aggregate from the crusher to the screen. The plant is offered with a choice of reciprocating feeder or swivel-feed attachment to fit different feeding conditions. The double-deck horizontal vibrating screen is 30 inches x 9 feet 5 inches.

Total weight of the Pitmaster is 31,000 pounds without the power unit; transport length with feeder attached is 33 feet; traveling height is 11 feet. The plant is operated by a 50 to 60-hp gasoline or diesel engine. The Pitmaster can also be converted into a modern quarry plant by putting a 15 x 36 or 15 x 24 portable primary in front of it.



The new Pitmaster crushing and screening plant has low traveling height and is readily portable. It is a product of the Iowa Mfg. Co.

An illustrated bulletin describing the Pitmaster is available upon request. Write to the company at 916 No. 16th St. and request Bulletin PS-1 described in CONTRACTORS AND ENGINEERS MONTHLY.

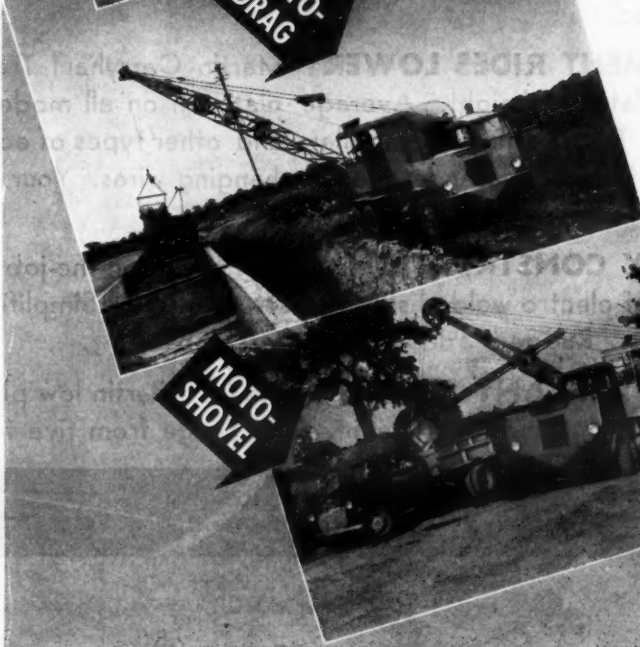
To aid you in securing further information on equipment or copies of catalogs described in this issue, we shall be glad to have you send us a list of those desired. We'll see that they are sent promptly.

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Concrete Pipe Laid Under New Freeway

Sewage Carried in 4 Rows Of 91-Inch Pipe Resting On Wood Pile Foundation; Work Done in Cofferdam

U. S. HIGHWAY 1, or State Route 25, is being reconstructed for 3.3 miles between Newark and Elizabeth, N. J.; an 8-lane concrete pavement will replace the present 4-lane 50-foot highway. In one of the five contracts on this project, the New Jersey Highway Department included the extension of a reinforced-concrete pipe culvert to carry Bound Creek under the heavily traveled freeway.

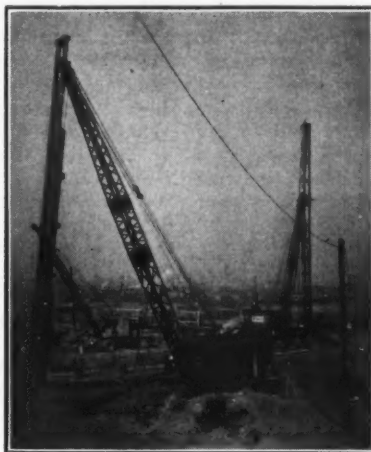
The contract including this work was awarded to Poirier & McLane Corp. of New York City for \$1,253,626.51. The bid price on the sewer extension was \$28,110. The remainder of the amount included construction of four grade-separation structures, and paving the eight 10-inch concrete lanes for a distance of 0.68 mile between Newark Junction and Haynes Avenue in Essex County.

The sewage from the southwestern area of Newark flows sluggishly across the Jersey flats in an open channel known as Bound Creek. Its soft, muddy banks have been prevented from crumbling by wooden sheet piling driven along the sides. They have been further stabilized with successive rows of round timber piles, which were driven four across the channel and capped with timbers extending between the rows of sheeting. On the way to its outlet in Newark Bay, this sewage channel flowed under the existing road in a 215-foot culvert built in 1927 and consisting of four rows of reinforced-concrete pipe. With the new highway, the culvert required an extension of the four rows of pipe for a distance of 36 feet or a total of 144 feet of pipe.

The new 6-foot pipe sections are similar in shape to those in the original culvert, and are constructed of heavily reinforced concrete. Each length weighs 10 tons. The top half of the pipe section is circular, while the lower half has a modified rectangular shape with a flat base 7 feet 1 inch wide. The inside di-

ameters, both vertical and transverse, are 7 feet 7 inches, providing an inside area of 50 square feet. At the bottom the pipe is 9 inches thick, while the roof and sides are 8½ inches; this makes the outside dimensions 9 feet ½ inch on the vertical, and 9 feet 0 inch on the transverse axes.

To support the heavy weight of the pipe on the unstable, tidal marshlands, a foundation of wooden piles was driven. It was then capped, and covered with a 2½-foot layer of broken stone, on which the pipe was laid. Because of the steady uniform flow of the creek, and the tidewater elevation of the Jersey meadows, the project required the construction of a cofferdam in which the culvert extension could be made. Starting in June, 1946, the pipe work



C. & E. M. Photo
Poirier & McLane used the Bucyrus-Erie pile-driving rig in the foreground to drive timber foundation piles for the reinforced-concrete pipe culvert, and steel sheeting for the cofferdam.

was completed in September. But the other phases of the whole contract, in-

cluding the pavement and bridges, will not be finished until some time this year.

Construction Planning

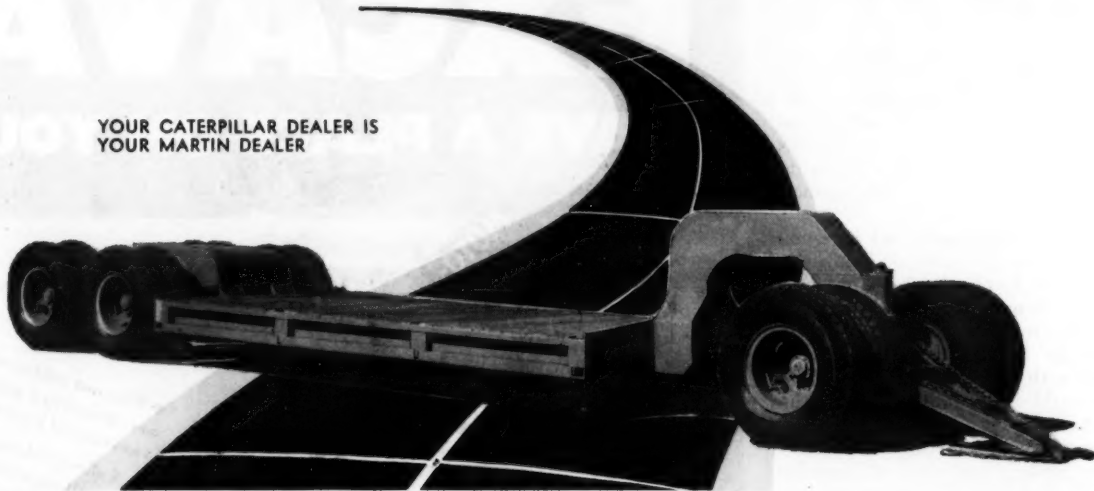
The new highway runs about north and south. Bound Creek crosses it at right angles, flowing from west to east in an open channel on both sides of the existing culvert. Poirier & McLane Corp. developed a well planned method of operation for constructing the new culvert, with each step carefully thought out in advance of the work.

At the west end of the existing culvert where the new pipe was to be added, a 9-foot section of an old concrete headwall was removed in front of the southernmost of the four rows of pipe. Then 12 feet of pipe was removed from this row so that later on the diversion channel could be more easily joined to this single row of pipe. A timber pile, which had been salvaged from those embedded in the channel and removed during the course of the work, was then

(Continued on next page)

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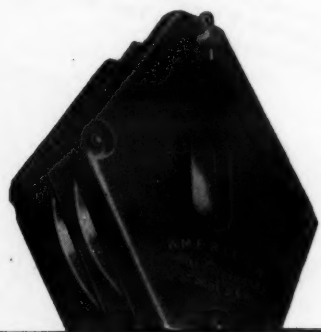
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C. & E. M. Photo

A Lorain 87 crane unloads a 6-foot 10-ton section of reinforced-concrete pipe from a Rogers trailer pulled by a Mack truck, on the Poirier & McLane job.

Concrete Pipe Laid Under New Freeway

(Continued from preceding page)

driven for temporary bracing at the southeast corner of the cofferdam, which measured roughly about 40 feet square.

Inner and outer frames were then set, and the steel sheeting was driven for the south side of the cofferdam. Both Bethlehem and Carnegie 16-inch interlocking steel sheet piling was used for the cofferdam in lengths of 30 and 35 feet. A Bucyrus-Erie pile driver with a 70-foot boom drove the sheeting with a free Vulcan No. 1 hammer minus leads. A 45-hp boiler on the rig furnished steam for the driving.

With this row of sheeting firmly in place, the diversion channel was then excavated along the south side of the piling to a width of about 10 feet. The south bank was held in place by 4-inch wood sheeting strengthened with 12 x 12 rangers. Other 12 x 12 rangers backed up the steel sheeting on the north side of the ditch which was then braced crosswise with 8 x 12 studs. The old channel sheeting was next removed so that a free flow into the diversion ditch was possible. Where the new ditch connects with the south row of pipe, the south side was strengthened with a wall of sandbags to prevent erosion. A Lorain 87 crane with a 50-foot boom and a Williams 3/4-yard clamshell bucket dug the ditch and later excavated within the cofferdam.

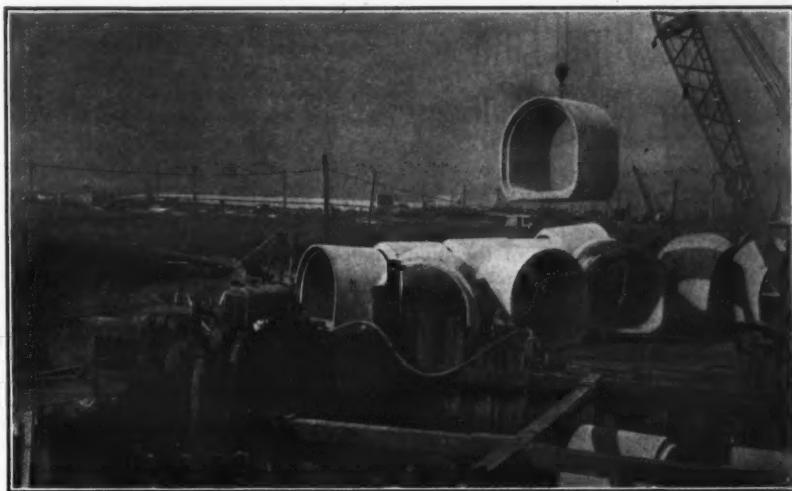
At the outlet or eastern end of the existing culvert, three of the pipes were sealed by constructing dams of bagged gravel and loose clay or other impervious material. These were set up in two tiers about 6 inches apart with concrete placed between them to form a core wall. Because of the tidal action of the creek, it was important to close off the outlet end as securely as the inlet of the culvert. Despite this solid dam, tidal water did enter the cofferdam; it percolated through the gravel cushion which topped the timber piling on which the original pipe was also supported. The seepage was overcome by driving sheeting well below the bottom of the pipe at the far outlet; this sealed off the pervious layer of material as well as the pipe itself.

Within the Cofferdam

The temporary inner and outer frames were then set up and the steel sheeting driven on the other sides to complete the cofferdam. It had 14 x 12 WF 78-pound beams for rangers and was cross-braced with 12 x 12-inch timbers. The old timber piles and caps which crossed the open channel were removed from within the cofferdam so that the clamshell bucket could excavate it to grade, or about 9 feet below mean sea level.

The same pile driver, but now using a McKiernan-Terry No. 7 hammer, drove the timber piles for the pipe foundation. Supplied and delivered to the job by the Nelson Piling Co. of Newark, N. J., the piles are about 60 feet long with tips averaging 8 inches and butts 16 inches. Because they will be completely immersed in water, the piles are untreated. After about a 15-foot layer of meadow muck had been penetrated, the driving became difficult as firmer material was encountered.

Working off the east side of the cof-



C. & E. M. Photo

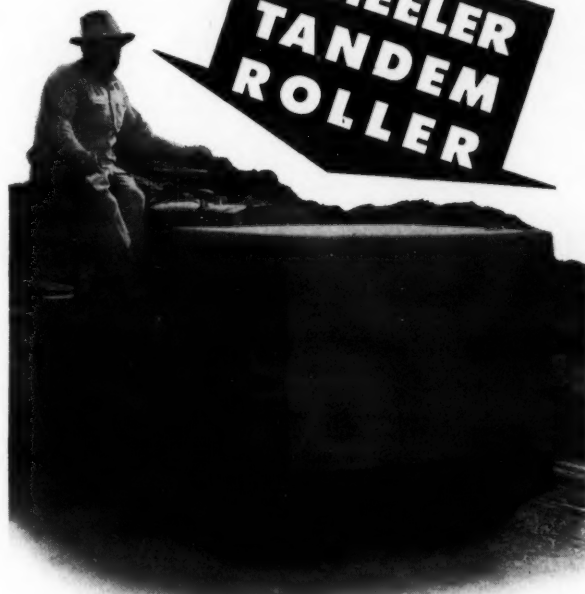
A section of culvert pipe is lowered into place. At left are the Goulds and Jaeger pumps used to unwater the cofferdam.

ferdam, the Bucyrus-Erie rig drove seven rows of piles. The rows were spaced 3 feet on centers, and each row

contained nine piles on 4-foot centers. The five remaining rows of piles at the (Continued on next page)

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The entire roller frame assembly is fabricated of electrically welded steel, braced to withstand long hours of heavy surfacing operations. Entire face of both compaction and steering rolls are machine finished, guaranteeing smooth surfacing action. Compaction roller is capable of delivering 150 pounds compression per lineal inch with water ballast, and is gear-connected to the driving engine by a specially constructed bull gear.

Dealers are now being selected. Write today for complete details and specifications.

SPECIFICATIONS

DIMENSIONS—Length, 10'7"; Width, 3'6"; Height, 3'11".

COMPACTION ROLLER—Width, 36"; Diameter, 37".

STEERING ROLLER—Width, 34"; Diameter, 27".

POWER—4 cylinder, 1400 R.P.M., industrial gasoline engine, with 2 forward and 2 reverse speeds.

COMPRESSION PER LINEAL INCH—Compaction roller—150 lbs. with ballast, 105 lbs. w/o ballast. Steering roller—70 lbs. with ballast, 48 lbs. w/o ballast.



CLOSE FINISHING is possible because frame extends only 1 1/2 inches past left side of roller.



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Concrete Pipe Laid Under New Freeway

(Continued from preceding page)

west end of the cofferdam were driven after some of the pipe was in place, with the driver perched on top of the pipe line. Timber 12 x 12-inch caps, 36 feet long, were then set on top of the piles; they were fastened to each with two $\frac{3}{8}$ -inch round spikes driven into $\frac{3}{8}$ -inch holes bored into the tops of the piles. The completed timber foundation is 36 feet square. Over the areas where the piles and caps were in place, broken stone was spread by the clamshell to a depth of 2½ feet below the top of the caps.

Six pumps were available for unwatering the cofferdam. All of these were generally in use when the contractor was preparing to lay pipe, so great was the amount of water present either from the ground, the sewer channel, or tidal flow. The pumps used included three Jaeger 6-inch, two Sterling 3-inch, and a Goulds 4-inch pump. As far as possible the pipe was set at low tide, when the cofferdam was driest. Sometimes this meant working at night. Then light was supplied by a Sure-Lite Little Red Devil 3½-kw generator, which also operated the electric saw used in cutting the timber.

Pipe Setting

The concrete pipe was purchased from the Massey Concrete Products Corp. at New Brunswick, N. J., 25 miles away. The bulk of it was delivered to the job by A. McDermott, a truckman of Newark, who carried three 10-ton sections of the pipe on a Rogers heavy-duty flat-bed trailer pulled by a Mack truck. The Lorain crane unloaded the pipe and also lowered it into place. For ease in handling, a 2½-inch hole had been made in the top of each 6-foot pipe section when it was constructed. Through this hole a 2-inch eye bolt, 18 inches long, was inserted and fastened with a nut. To prevent the nut from cutting into the concrete, a 6-inch-square steel washer, ½ inch thick, was slipped between the nut and the inside surface of the pipe. The hook from the cable boom of the crane engaged the eye bolt, and the pipe was smoothly and quickly shifted about.

The three rows of pipe to the north were laid first as far as the piles and caps were in place to support them. The remaining piles were driven by the rig, which was set up on top of the newly laid pipe in order to reach the five rows at the west end of the cofferdam. Before the driver was run out on the new pipe, the sections were first posted and wedged inside with a post at each joint. Then, on top of the pipe, two layers of timber mats were placed at right angles to each other. The caps were set in place and the stone cushion distributed. The driving rig made no lifts when out on the pipe unless each crawler tread was approximately over the center of a line of pipe. Running along the top of each row of pipe was a 12 x 14-inch timber to support transverse pieces of similar section.

The rows of pipe were set flush against each other. But because of the curved corners, wedge-shaped openings remained at the top and bottom of the adjoining sections. At the bottom the openings were filled with concrete, and at the top the joints were sealed with plaster.

In order to lay the south or last row of pipe, the cofferdam had to be revised and the creek diverted again from its temporary channel. The dams were removed from the downstream end of the two northernmost lines of pipe, but the third line was left closed. From the north half of the west wall of the cofferdam, the steel sheet piling was removed

with a Vulcan 800A pile extractor. It was also removed from the short portion in front of the south row of pipe at the east side of the structure. Well compacted backfill was then placed outside the south wall of the cofferdam, to fill up the diversion ditch and thus direct the creek through the two north lines of pipe.

An additional obstacle to be overcome in setting the remaining south row of pipe was the presence of a 60-inch sanitary sewer which emptied into the original line just east of the cofferdam. The discharge of this sewer was cut off. The contractor built a wooden plug on skids and inserted it into the west end of the part which remained in place after the two old sections of pipe had been removed at the beginning of the job. This plug was well anchored, and yet built so that it was easily drawn out after the line of pipe was laid. The remaining south part of the original cofferdam was then unwatered, and the two 6-foot lengths of concrete pipe previously removed from the south line



C. & E. M. Photo

The Lorain crane lowers a pipe section into the cofferdam to extend the existing sewage culvert under the new freeway at Newark, N. J.

were replaced. The new concrete pipe was then set to complete the culvert, and the remainder of the concrete fills

were placed at the bases of the pipe at the west end.

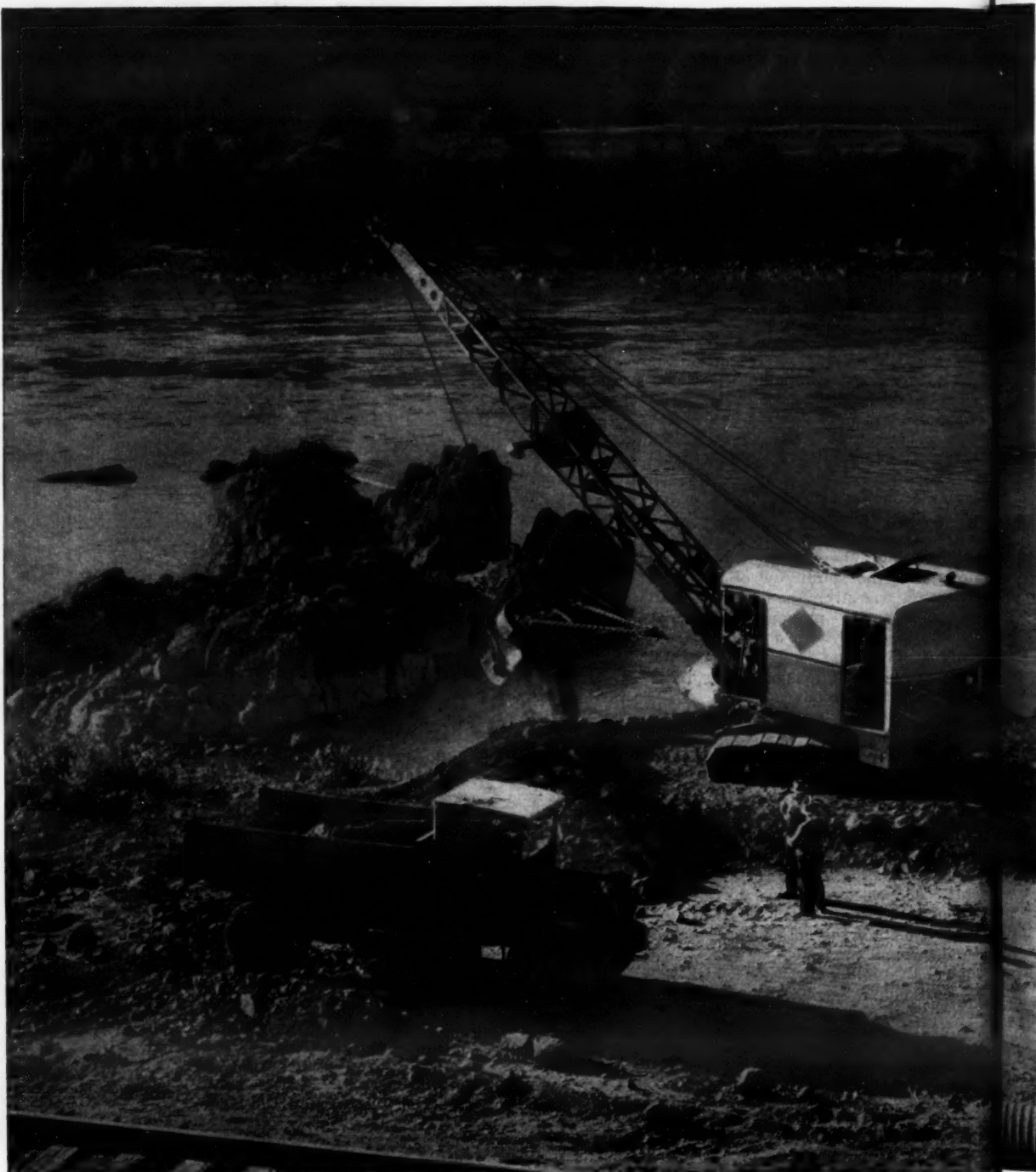
The west wall of the cofferdam was then removed and a concrete headwall, 36 feet long x 3½ feet high and 1¼ feet thick, was built at the top of the west end of the four lines of new concrete pipe. The remaining plugs and dams were removed from the pipe lines, and the timber waterway was reconstructed in the creek west of the culvert with details similar to those in the existing structure. The backfill was completed inside and outside the cofferdam and from 1½ to 2 feet over the top of the pipe in preparation for the new concrete pavement. The temporary bracing and excess timber was then removed, along with the remainder of the cofferdam.

Quantities and Personnel

The chief items of material required for this 36-foot culvert extension were but three:

Reinforced-concrete pipe, 91-inch	144 lin. ft.
Timber piles, untreated	6,480 lin. ft.
Crushed stone	360 cu. yds.

(Concluded on next page)



Tune in . . .
TEXACO STAR THEATRE
presents the NEW
EDDIE BRACKEN SHOW
every Sunday night.
Metropolitan Opera broad-
casts Saturday afternoons.



TEXACO

Concrete Pipe Laid

(Continued from preceding page)

An average force of ten men was employed on this Bound Creek culvert extension. The job was under the supervision of C. W. Noye, Superintendent, and Earl Lucas, Engineer, for Poirier & McLane Corp., of which Patrick Jordan is General Superintendent and William Sheehan, Chief Engineer. Major H. R. Gabriel is Resident Engineer in charge of all bridge construction on the new freeway for the New Jersey State Highway Department, which is headed by Spencer Miller, Jr., Commissioner. Morris Goodkind is Bridge Engineer. R. M. Beck, Northern District Engineer, directs all construction projects in the north part of the state.

Asphalt Institute Officers

The Board of Directors of the Asphalt Institute, at their annual meeting, announced the election of officials for 1947. C. Wayne Barbour of Allied Materials



C. & E. M. Photo

A worker disengages the crane lifting gear from a hole in the top of the concrete pipe section after it has been lowered into the cofferdam.

Corp., Oklahoma City, has been named President and Chairman of the Executive Committee. Bernard E. Gray was

re-elected General Manager-Chief Engineer, and Herbert Spencer was elected to the position of Secretary. Other officers are F. V. Widger, Treasurer, and John N. Smith, Assistant Treasurer.

Vice Presidents elected to serve the various areas are: Atlantic-Gulf, J. S. Sawyer; Ohio-Great Lakes, D. N. Myers; Midwest, Inghram Grayson; Southwest, James J. Kelly; Pacific Coast, Raymond Harsch. These men, plus George R. Christie, complete the Executive Committee.

Aggregate-Handling Line

The entire Universal line of portable plants and basic units for crushing, pulverizing, conveying, screening, and washing equipment, is described in a new bulletin recently off the press. Pictures of typical installations and flow-of-material diagrams are included.

Bulletin 467 G is available on request by writing the Universal Engineering Corp., 625 C Ave., N. W., Cedar Rapids, Iowa.

Report on Meeting On Highway Research

Twenty-Sixth Annual Meeting of Highway Research Board Held in Washington; Many Papers Presented

THE Highway Research Board held its Twenty-Sixth Annual Meeting at the National Academy of Sciences in Washington, D. C., December 5 to 8, 1946. The meeting led off the usual winter program of national conventions and conferences having to do with the highway and heavy-construction industry. Over 600 delegates attended. These included representatives of state and Federal highway departments, educators from technical colleges, plus a handful of equipment manufacturers and suppliers of highway materials. At the four-day gathering, morning, afternoon, and evening sessions were conducted. Technical papers were read and discussed, and reports of the activities of the Board's various committees were put on record.

Professor R. L. Morrison, Chairman of the Executive Committee of the Board, presented the Highway Research Board Award to K. B. Woods and Harold S. Sweet, both of Purdue University, and T. E. Shelburne of the Virginia Department of Highways. The award was made for their joint authorship of a paper entitled "Pavement Blowups Correlated With Source of Coarse Aggregate", which was presented at last year's meeting in Oklahoma City.

Thomas H. MacDonald, Commissioner of Public Roads, gave the principal address. In it he praised the Board for its "great constructive effort for the future, not only of our own country but other countries of the world". Mr. MacDonald mentioned the oxcart method of transportation in India, but also cited the rapid advancement of highway transportation in Latin America and how it is raising the standard of living in those countries. He added that highways improve the health of people by enabling them to bring in the proper foods for a suitable diet.

Memorial Planned

The Committee on Roadside Development passed a resolution to dedicate a roadside park or site as a memorial to Theodore Reed Kendall, late Editor of CONTRACTORS AND ENGINEERS MONTHLY, in remembrance of his work in advancing the cause of roadside development along the highways of the nation. The memorial will be located in Massachusetts where Mr. Kendall was born and educated. The Massachusetts Department of Public Works is cooperating with the Committee to select a suitable site of simple and natural beauty.

Hauling, Dumping System

One truck with a litter of bodies is the phrase with which Brooks Equipment & Mfg. Co. describes the Brooks Load Lugger in its new catalog. When installed on a standard truck chassis, the hydraulic hoisting mechanism and frame is designed to pick up a loaded bucket, place it on the truck for transport, and dump it at its destination.

With the use of several buckets, as the catalog explains, workmen do not have to wait for trucks to pull up, and the trucks do not have to stand by waiting for loads. The buckets are said to have this advantage, too: they involve loading at knee level instead of tossing material onto a truck.

The Model CH Load Lugger is the latest improved design. It is built to handle four bucket capacities, from 1½ to 4 cubic yards, struck measure. Catalog 46 can be secured promptly by writing to the company at 408 Davenport Road, Knoxville 8, Tenn.

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equipment. For full details about these and the Texaco Simplified Lubrication Plan, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write:

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More than 250 million pounds of *Marfak* have been used to date!

Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

Bridge Repair

(Continued from page 1)

there anything we can buy to build a temporary trestle?" McLeese asked.

"We have wood piles in stock at the Green River maintenance shed, and we can buy or, if necessary, cut some 8 x 18-inch timber for beams."

"Okay then, you set up an organization and get started. Phone me if there's anything you need from this end. I'll stay here at the office until 6. After that call me at home."

Housecroft broke in hurriedly, "Listen, Roy, we'll need a crane to drive those piles. We'll need a set of leads and a pile hammer."

"Get Rowland's," McLeese ordered, remembering that contractor T. G. Rowland was at that very moment moving a Bucyrus-Erie 20-B crane to his culvert contract at near-by Bootlegger Wash. Small details like this one are constantly on file in the Chief Engineer's mind. They are a part of the secret of his competence. "And listen, Housecroft, you'll have to make your own design, compile a materials list, and gather men, materials, and equipment. I'll okay anything you do, so have at it."

Hell Lets Loose

It took just 24 hours for the gates of hell to open, and a flock of local newspaper editors had oiled the hinges. They castigated the holy and unholy in their editorial wrath. Why was the bridge overloaded? Why had it failed? Why, long ago, had a new structure not been built to replace the old? One newspaper wanted to know why a Bailey bridge span, such as the Army Engineers used in Europe, couldn't be installed in a matter of hours. All perfectly logical questions. People in the state capital repeated them to the Chief Engineer.

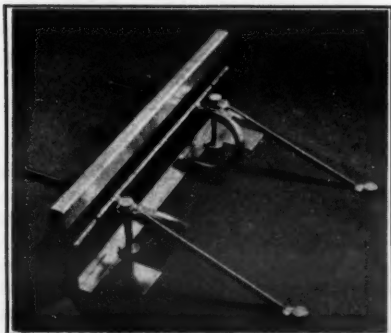
The little man with incongruously big hands and ever-immaculate blue suits, set his wide mouth in a thin slash and said, "Go away. We've got a bridge to build. After that we'll answer questions."

Again public opinion arose to plague McLeese. A civic-minded group suggested to an Army colonel at a near-by military post that Army Engineers build a Bailey bridge.

Sure, said the Army. Pull the state

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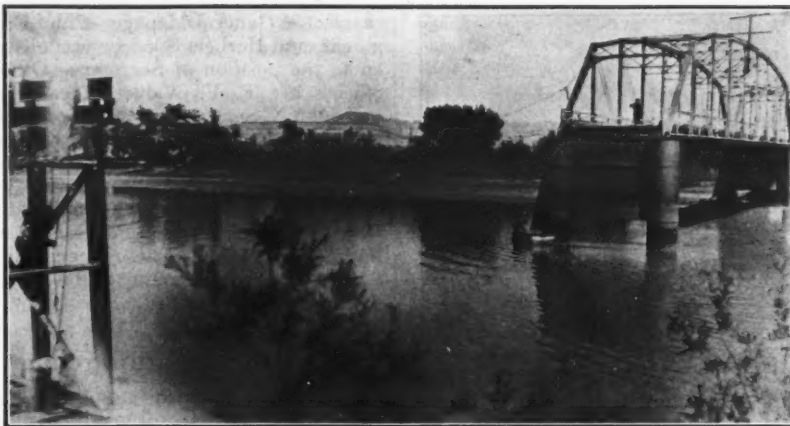
The DOW-WELD joint is delivered in the form of a rigid welded truss unit and is permanently anchored to the subgrade, thus insuring a true alignment of the dowels. Due to the staking device it is not necessary to disturb the concrete.

This joint has been extensively used for the past ten years on major highway and airport projects, and the results have been tested and proven to be satisfactory.

We shall be glad to furnish the location of such projects upon request.

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Utah State Road Commission Photo

This view of Green River shows where the bridge span collapsed. Welders at the left are tack-welding the steel I-beams.

highway forces off the job and we'll put the order in right away. You'll have your bridge in 72 hours.

The group got an order routed to McLeese; it told him to pull his men off

the job, that the Army was going to put in a Bailey truss. McLeese said, "Fine. Tell the Army to go ahead and order its Bailey span. But we will not stop operations. As long as I am here, the re-

pair of this bridge is the responsibility of the State Road Commission. And if I know anything at all about the Army, we'll have traffic across Green River before they can get their bridge on the job."

Somebody got that back to the Army. A colonel ordered the Bailey span and gave instructions to ship without delay.

Trouble at the Bridge

Meanwhile, Housecroft was fighting with his back literally to the river bank. He had commandeered the 20-B Bucyrus-Erie crane and drop hammer from T. G. Rowland. An air compressor came in to power the boring tools. Five private sawmills were contacted and arrangements made to cut the timber to Housecroft's specifications, from trees still standing on the mountain slopes. Bridge repairmen were rushed in with acetylene burning equipment.

By Saturday morning—the bridge collapsed on Tuesday afternoon—the crumpled trusswork had been burned

(Concluded on next page)

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Bridge Repair

(Continued from preceding page)

off in pieces small enough for the crane to lift out of the river and cast aside.

McLeese, who had driven 200 miles from Salt Lake City, prepared to return. "I'd better get back and fan the smoke out of the office," he laughed ruefully, remembering the editors. "If these wood piles won't drive, give me a call."

What he meant or how shrewd an appraisal he had made was not apparent at the moment.

The first wood-pile bent was successfully driven and capped. The Bucyrus-Erie crane crawled out and spotted its leads over the next bent 22 feet away. The repairmen set a pile in place and began to slam it down with the drop hammer. Instead of penetrating, it bounced.

When they examined the small end, to see what was wrong, they found it broomed as if the wood had beaten against granite.

"They won't go down," Housecroft reported to Salt Lake City by telephone.

McLeese asked, "Where'd you hit ledge rock?"

"On the second bent. Can we get steel piling?"

"I think so. There's a couple of 12-inch H-beams in the Green River shed. Start them for test piles. I'm leaving here right now and should get there by the time you drive 'em to refusal."

His automobile arrived as the second H-beam was being driven. McLeese squinted at the battered web of steel at the top of the pile. The story it told of punishment under the heavy hammer was plain. "Refusal?" asked McLeese.

"Less than 1/8 inch to a blow with a 2,600-pound drop hammer," answered the Bridge Engineer.

"How much penetration?"

"About 30 inches."

"Wow! Well, it's a cinch the ledge won't scour out if it's that hard," grunted McLeese as he made his decision. "Let's build a steel bridge. I'll get the piling from warehouse stock around Salt Lake City."

"Maybe the Army's Bailey bridge will come," Housecroft suggested.

"Don't kid yourself. Design something that can use 27-inch I-beam girders 42 feet long. I know where they are," McLeese hurried off.

Hastily he telephoned Salt Lake City. At the union hall, a structural-steel foreman named Whitey Yost said he and his gang were laying off for a few days between big jobs.

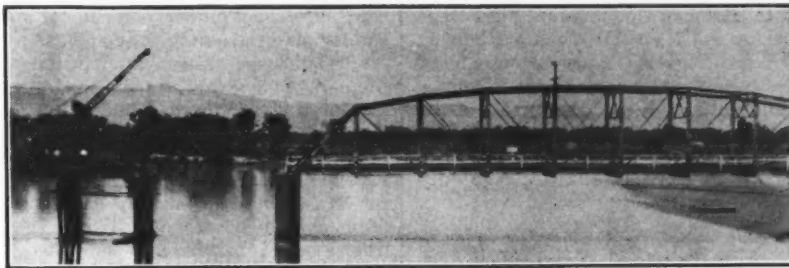
"Bring your gang down to Green River and get here as fast as you can," said McLeese. "If you guys like to work you're going to have a hell of a lot of fun here!"

"Mister, you interest me," said Yost. "We'll be down."

Full Speed Ahead

Another call started 12-inch H-beam piling on the way. Then for four hectic days and nights, steel workers and pile-driver men tried to keep pace with the Chief Engineer, who stayed day and night to share this challenge with his men. Hour after hour the operator on the Bucyrus-Erie crane hoisted and dropped the hammer, slamming each pile in to refusal. Men on a raft braved the river current to guide the bottoms of steel piles into place. Welders burned the tops off square, capped the H-beams, and tack-welded girders in place. Up in the mountains five sawmills, operating on changed specifications, ripped 3 x 8-inch and 4 x 12-inch timbers for decking.

Men like Assistant Chief Engineer W. L. Anderson, Construction Engineer R. W. Griffin, and Maintenance Engineer Ray Gillis, took time from their regular routine to carry through the long-dis-



Utah State Road Commission Photo

Looking downstream, this view shows completed temporary bents about to join up with the main bridge over the Green River in Utah:

tance orders of McLeese. The District Engineer from Price, Utah, and his staff all had their parts to play.

Hour after hour this gang of construction stiffs followed the embattled, weary figure on the bridge in the best tradition of construction men. The immaculate blue suit no longer was creased. Its pants bagged like crooked piling. The coat had been thrown away. The white shirt, open halfway to the belt, was smudged with grease. Mc-

Leese drove the men without mercy.

"Hey, that boy's okay," one grizzled old pile butt observed. "He knows what he wants."

"Yeh, it looks to me like he done plenty of field work before he put on that white shirt," his buddy agreed.

Bent after bent slammed home. Workers slapped girders in place, easing them down while a welder clambered over the web to tack the member in. Until, 15 days after the bridge collapsed,

the temporary structure was in shape to let the first car across. It will continue to serve until the new Federal Aid bridge is built over Green River.

Editors crowed on page 2. "By calling to your attention the extreme urgency of the Green River Bridge failure, we feel that we have expedited its reconstruction," they said.

McLeese read the newspapers and grunted, "They don't know how right they are!"

On August 17, 1946, the civic group called.

"The Army has delivered the Bailey bridge," it announced. "Now we'll get some action. You can remove your men."

"We pulled 'em off three days ago," said the tired, tough little man with the again immaculate attire. "Store the bridge in our main warehouse for future use. The one at Green River has been carrying traffic for 72 hours!"

Accidents are costly and unnecessary.
Remember—Safety Always Pays!



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The new Model 3 Athey Force-Feed Loader is here! As a result of five years field performance and engineering research, Athey proudly presents this latest addition to its line of loading and hauling equipment. Every State, County and Township Highway Department will find the new Model 3 the fastest, most economical answer to its loading problems. It is new in features of design — new in performance. Such design features as "Finger-Tip" hydraulic control, new conveyor design for faster loading, new protection for the power plant, greater operator comfort and better visibility are only a few of its outstanding developments. It's the last word for loading on road widening and resurfacing jobs, ditch building and cleaning, dressing slopes, loading oil mix, etc. It has smooth, clean pickup of all types of materials, high rate of production, one-man operation and "one-lane" loading which does not interfere with the normal flow of traffic. Investigate the new Model 3 today. See your Athey-"Caterpillar" Dealer, or write direct to ATHEY PRODUCTS CORPORATION, 5631 West 65th Street, Chicago 38, Illinois.



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Four levers operate the hydraulic controls for raising and lowering feeder, mold-board, throat and conveyor. The last word in operating simplicity and accurate control.

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H. K. Bishop Joins ARBA

H. K. Bishop has joined the American Road Builders' Association as Manager of the County Highway Officials Division and the Municipal Division, it has been announced. He succeeds Major John A. Long who resigned last summer.

Mr. Bishop received his engineering degrees at Cornell University. He began his career as assistant city engineer in Hudson, N. Y. Some of his subsequent posts include Superintendent of Public Works for the Territory of Hawaii, Chief Engineer of the Indiana

State Highway Commission, First Deputy for the New York State Highway Commission, and Deputy Commissioner of the Public Roads Administration.

He will assist in the activities of the American Institute of Local Highway Administration, which was founded at the ARBA convention in Chicago during January, 1946.

Ice-Control Spreader

A timely bulletin on its anti-skid spreader is now available from the All-Purpose Spreader Co. The Model J.V.P. is designed for spreading calcium chlo-

ride, salt, sand, cinders, limestone, and similar materials on icy pavements.

It is a 2-wheel trailer which fastens to the ears of the drawing truck by means of a pin. Power for the unit is derived from the traction of its own wheels; it operates whether moving forward or in reverse. Capacity of the spreader hopper is 5 cubic feet, and the baffles are adjustable to control width of spread. The amount of material spread per square yard depends upon the amount permitted to pass through the measuring gate onto the rotating disk.

Copies of this piece of literature describing the J.V.P. spreader may be ob-

tained free of charge by writing to the manufacturer at P. O. Box 105, Fuller Road, Elyria, Ohio, and requesting Bulletin No. 5M.

Joint-Sealer Sales Agent

The appointment of Lynn W. Young as midwest district sales representative for Sealz has been announced. Mr. Young will make his headquarters at 4804 Jefferson St., Kansas City, Mo. Sealz is a rubber highway joint-sealing compound. It is made by the Naugatuck Chemical Division of United States Rubber Co.

"CATERPILLAR" DIESEL TEAMWORK ON THE SAN DIEGO AQUEDUCT

On a 22-mile section of the U. S. Navy's new San Diego Aqueduct, north of Escondido, Calif., J. S. Barrett has combined several types of "Caterpillar" Diesel equipment to do an effective job.

In building haul roads by which trucks could bring sections of concrete pipe to the aqueduct site, three "Caterpillar" Diesel D8 Tractors took care of the ripping and 'dozing, and a "Caterpillar" Diesel No. 12 Motor Grader did the finishing. On the same

job, a "Caterpillar" Diesel D13000 Engine powered the compressor.

The advantages of standardizing on dependable "Caterpillar" Diesels have been proved on hundreds of earthmoving contracts. Operators do better work when they are handling these familiar machines. And the prompt service of one experienced dealer for all equipment means maximum output with minimum loss of time.

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ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



A "Caterpillar" Diesel No. 12 Motor Grader, used for finishing and maintaining haul roads.

Two "Caterpillar" Diesel D8 Tractors bulldoze earth for access roads on the San Diego Aqueduct north of Escondido, Calif.

Maine Turnpike

(Continued from page 2)

that represent the best practice in the light of present knowledge. They are long-range standards for the future.

Modern Design

The alignment was selected (1) to give the shortest economical distance between the two Turnpike terminals, and (2) to afford safe driving speeds of 60 mph in rolling topography and 70 mph in flat topography. Maximum grade is 5 per cent. Curves do not exceed 1 degree, with two exceptions: on access roads, or at points of traffic interchange where a minimum of 125-foot radius is maintained. At these latter locations the curves are superelevated a maximum of 0.08 per foot of width of pavement. There are only 18 curves on the entire Turnpike.

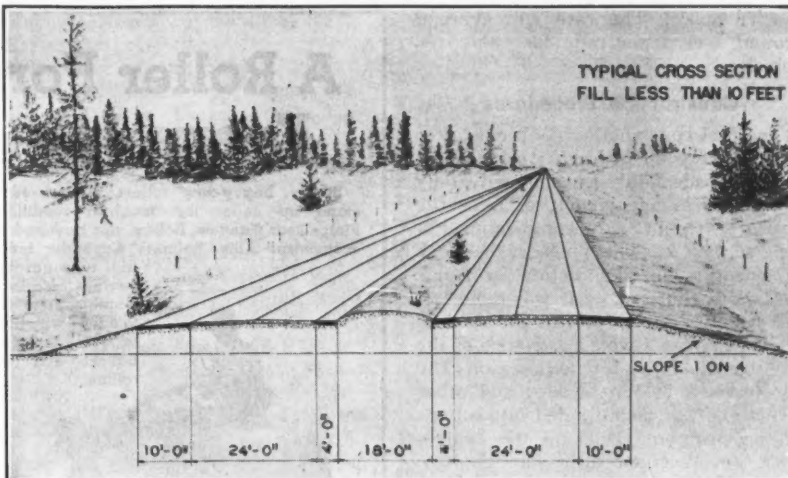
All sections of the dual highway are designed to afford a continuously unobstructed view from a height of 4.5 feet above any point on the roadway surface, to the top of an object 4 inches high and 525 feet ahead on the roadway surface. Careful attention was given to these utilitarian aspects of the project, since amortization will depend on the amount of truck and passenger-car traffic diverted to the Turnpike and induced by its convenience. These factors assure expeditious, safe, and comfortable travel for which the user will pay toll.

Down the center of the right-of-way is the 94-foot roadway. It will consist of two 24-foot pavements with 10-foot outside shoulders and 4-foot inside shoulders, with an 18-foot dividing strip. The pavement will be asphaltic concrete, while the shoulders will have a surface of bituminous-treated gravel. This will be full width on the inside shoulder and 8 feet on the outside. Both shoulders will slope $\frac{3}{4}$ inch to the foot.

In fills less than 10 feet, the side slopes are 4 to 1; those of greater height are 2 to 1 and are protected by guard rail. In earth cuts the horizontal distance from the edge of the shoulder to the center of the ditch is 16 feet; the bottom of the ditch is 4 feet below the center crown of the pavement. In cuts 5 feet and under, backslopes are 3 to 1; and where the cut is deeper than 5 feet, the backslopes are 2 to 1. In rock the backslopes are $\frac{1}{4}$ to 1, and ditches are 2 feet deep.

With the exception of the center strip, the roadway is given a foundation of permeable material. This extends out under the shoulders to meet the slope line. The thickness varies from 1 foot in the rock cuts to a maximum of $3\frac{1}{2}$ feet in the earth cuts and fills, assuring excellent drainage to the new road. This foundation course meets the specifications of Public Roads Administration Class A3 material, which is medium coarse with not more than 10 per cent passing the No. 200 sieve.

The dividing strip is raised 18 inches above the crown of the adjoining pavements. It will be seeded and later planted with low shrubs and evergreens to eliminate the glare from opposing headlights. The natural growth of shrubs, evergreens, and other native trees in this locality affords an economical means of effective landscaping of the highway. In clearing the right-of-way, a ribbon of forest is preserved on each side. It screens the location of roadside borrow pits and any unsightly views adjacent to the highway. In the construction operations, needless damage to existing trees and growth was avoided; thus the natural appearance of the road and the wayside through the Maine woods has been preserved. Additional planting may be considered desirable to improve the appearance of the Turnpike. If so, it will be done



when the highway is in operation and producing revenue to justify the expenditure.

Bridges and Grade Separations

To eliminate all cross traffic and stop

lights from the highway, 43 bridges will be constructed. These include 3 at major stream crossings; 5 at minor stream crossings; 9 state-road grade-separation structures; 22 town-road grade-separation structures; 3 access-road

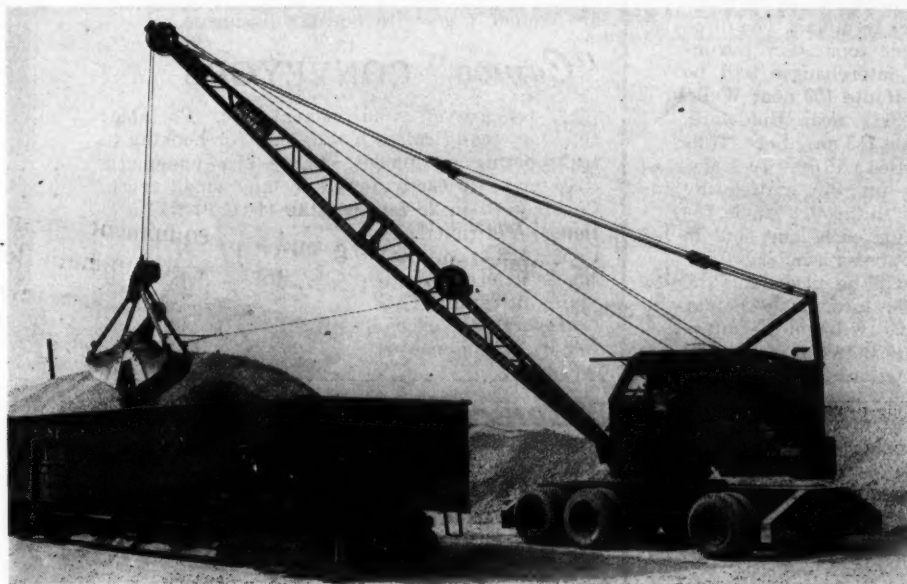
grade-separation structures; and a railroad grade-separation structure.

The major stream crossings are classified as long bridges, with lengths between abutments greater than 80 feet. The three in this category have total lengths of 305, 600, and 616 feet. They are of deck-type construction with either I-beam or plate-girder spans supported on concrete pile bents or concrete piers. The two longest cross the York and Saco Rivers respectively. Each stream crossing throughout the length of the Turnpike will consist of twin structures. They will have 28-foot roadways spaced 50 feet center to center to maintain a minimum median-strip width of 26 feet, including inside shoulders. Structures are designed for an H20-S16 loading.

The five minor stream crossings are concrete arches with 28 to 40-foot spans. They accommodate the two roadways without deviation from the normal alignment.

Of the thirty-two grade-separation (Continued on next page)

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Maine Turnpike

(Continued from preceding page)

structures, all but four carry the cross-road over the Turnpike. They provide a clear height of at least 14 feet over the pavement, and a horizontal clearance to accommodate the full width of pavement, median strip, and shoulders. A central pier is founded within the median strip with its sides not less than 11.5 feet from the inner edges of the adjacent pavement.

Where the Turnpike crosses above the side roads and the railroad in four locations, the design of the structures is similar to the twin bridges at major stream crossings. All these structures are steel I-beam spans on concrete bents. The concrete decks of all bridges will be constructed with air-entraining cement to prevent scaling in the cold Maine winters.

Limited Access

In pleasant contrast to U. S. 1, which passes through a succession of towns and villages on narrow winding streets that are especially bottlenecked in summer, the new Turnpike will have limited access. This will serve two purposes: to speed traffic along, and to afford the maximum economy in operation costs.

Present plans call for three points of access along the entire route, in addition to entry at the terminals. The three access-road grade-separation structures for traffic interchanges will be located on State Route 109 near Wells, on State Route 111 near Biddeford, and on State Route 112 near Saco. Thus only five toll houses will be necessary. To locate these on the expressway would interfere with through traffic, require collectors for each lane, and in general would not be satisfactory. Consequently they will be placed on the access roads at the interchange points, and through traffic will not be interrupted or delayed between north and south terminal stations.

Additional traffic interchanges may be added if they are economically justified, as, for example, at certain points where summer traffic to near-by beaches may be heavy. An analysis of amortization of the construction, maintenance, and operation costs of a traffic interchange within the amortization period, indicates that an additional interchange is not justified unless a station will produce an additional average annual gross income of \$24,480 for a period of 23 years. For a station operated on a limited time basis, it is estimated that the average annual gross revenue must be \$17,480 for the 23-year period.

For a free flow of traffic at these interchanges, four ramps are provided, one for entering and one for leaving in each direction. Connecting these ramps to the main artery are acceleration and deceleration lanes which may be as much as 1,200 feet long. Vehicles leaving the Turnpike at cruising speed will be able to reduce speed on the decelerating strips before entering the egress road. Similarly, cars from the ingress road will be able to attain the cruising speed of the Turnpike on the acceleration strips before entering the Turnpike lanes. By the use of traffic lines or by coloring the surfaces of the acceleration and deceleration strips, they will be made easily distinguishable to the motorist.

The interchange scheme will require only one toll booth, with one toll collector serving traffic from both directions when traffic is not too heavy; this will afford the maximum economy in operation costs. In entering an access road, a car driver will be issued a slip on which the station of entry is recorded. On leaving the Turnpike, he will surrender the slip and pay toll according to the distance traveled on

the Turnpike. The rate will average around 1 cent per mile for passenger vehicles.

Construction Procedures

The first construction contracts, after borings were taken for the bridge sites and subgrade analyses, included grading and drainage structures over the entire project. (See accompanying article on page 2.) This phase of the work is scheduled for completion by April, 1947. But the bulk of it was done before this winter to permit the settling of embankments well in advance of the paving, scheduled for next season. The construction of the bridges and other structures was also divided into a two-season program. Bids on the bridges were not received until late in July, 1946. This, however, permitted such work in the first year as excavation for foundations, driving of piles where required, building of substructures, and placing fills for approach embankments; it also permitted settlement during the

(Concluded on next page)

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The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

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This roller smooths as it packs, like the household flat iron from which it takes its name. It was specially designed by an experienced paving contractor, to smooth as well as compact stabilized bases, bituminous "cold lay" wearing surfaces and seal coat aggregates. The spacing of the five exceptionally wide tires results in maximum densities being obtained with a minimum of equipment operations.



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Maine Turnpike

(Continued from preceding page)

winter season.

Next season the roadway operations will include finishing the permeable gravel sub-base, followed by paving, constructing the shoulders, placing loam topping, seeding and planting, and installing guard rail plus right-of-way fencing. On the bridges the superstructure steel will be added, concrete spans poured, and approach embankments surfaced. The construction of toll, administration, and maintenance facilities and lighting installations have also been deferred until the second year.

This program required, during the first year, materials which were readily available. Materials for the second year's operations should be more easily obtained than they are now, including steel for the structures. Bids for the paving were received in late November of 1946. During this winter, the contractors can plan their work and get equipment in readiness.

Future Sections and Personnel

This first 47.4-mile section of the Maine Turnpike from Kittery to Portland will be opened late in 1947 if the work schedule is maintained. Later it will be extended further to the northern boundary of the Pine Tree State. The construction of other sections will depend on the response of the traveling public. If it uses the new toll road in sufficient volume, private capital will finance the extension of the Turnpike. Traffic studies and topography will largely determine the course of the route beyond Portland, but it will be divided roughly into four sections: Portland - Augusta, Augusta - Bangor, and two sections from Bangor to Fort Kent.

The new highway will be maintained and repaired by the Authority. Maintenance buildings for storing trucks, snow plows, and general repair equipment, together with office facilities for administrative personnel, will be conveniently located on the right-of-way. Concession buildings for filling stations and restaurants will also be built along the expressway.

The \$15,000,000 estimated cost of the total project is broken down into the following categories:

Construction costs	\$11,406,200
Engineering (6 per cent)	684,372
Real estate (including legal)	200,000
Administration, legal and preliminary operation (including publicity)	75,000
Interest during construction (2½ years)	1,050,000
Contingencies, including real estate and bond discount	1,584,428

Total bond issue \$15,000,000

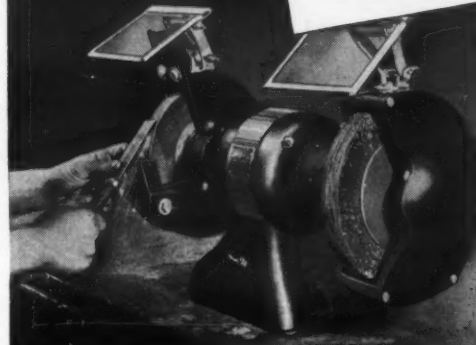
The Maine Turnpike Authority consists of four members appointed by the Governor for terms of 4, 6, 8, and 10 years respectively from the date of their appointment. They are: Joseph T. Sayward, Chairman, Kennebunk; Paul C. Thurston, Vice Chairman, Bethel;

Charles W. Diggery of Sanford; Boyd N. Harrington of Patten. In addition, the Chairman of the State Highway Commission, Stillman E. Woodman, is a member ex officio. The Authority has elected Lucius D. Barrows, Chief Engineer of the State Highway Commission, to the post of Secretary and Treasurer, and Williams B. Getchell, Jr., as Executive Director. Neither of these two is a member of the Authority. The Authority has its headquarters at Kennebunk, about halfway between Kittery and Portland.

Howard, Needles, Tammen & Bergendoff, Consulting Engineers on the Maine Turnpike, also has an office at Kennebunk. There the firm is represented by L. C. Hammond, Project Engineer; L. D. Brown, Assistant Project Engineer; C. H. Peterson, Field Engineer; L. E. Olson, Operations Engineer; and H. P. Cousins, Office Engineer.

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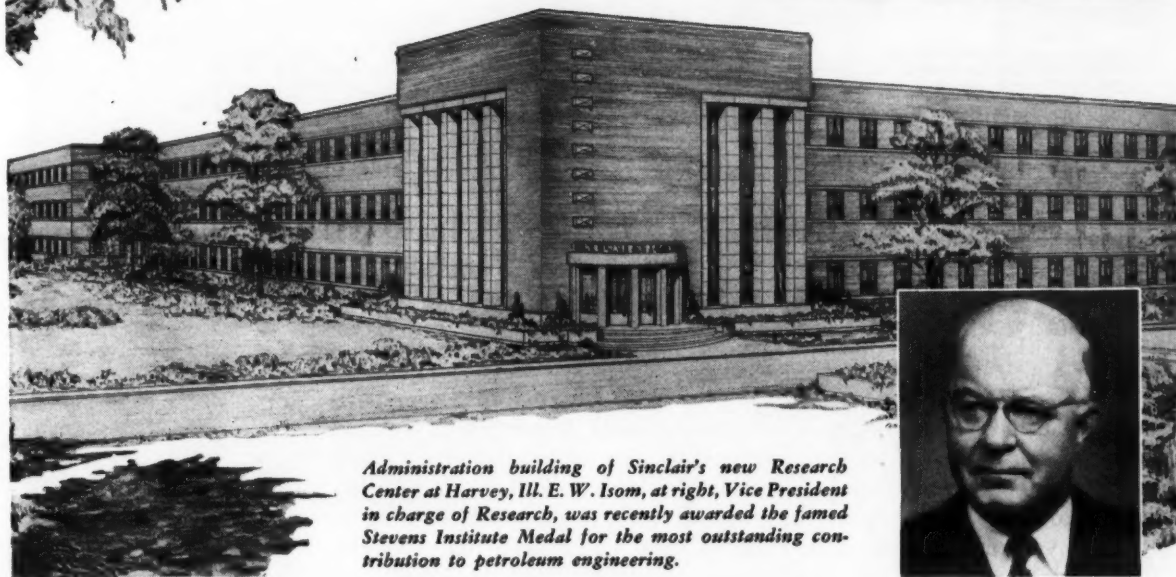
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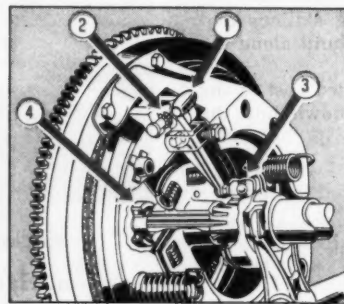
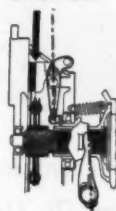
Wherever earth, building materials, coal or similar bulk loads have to be hauled, you'll find Ford Trucks paying off handsomely. This Heavy Duty Ford 2-ton unit has Hoist and Dump body by Marion Metal Products Co., Marion, Ohio.



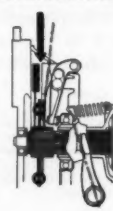
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County Handles Heavy Snowfall at Low Cost

Despite 6-Month Season and Average Annual Snowfall of 150 Inches, Costs Are Held At \$75 to \$150 Per Mile

UPPER Michigan's Gogebic County has a predictable snowfall. In fact, if you predict snow on any day between mid-October and mid-April, you will probably be right. And if you extend your prognostications beyond this six-month season, it is still an even chance that a "snow and colder" prediction will be right. A snowfall of 10 inches has been recorded during April, and just a few years ago a fall of 2 inches was registered in June.

But though the snowfall itself is predictable in this county with one of the country's longest snow seasons, the type of snow is not. It may be hard and frozen, wind-driven from the cold expanse of Lake Superior; it may be heavy and wet. During the 1945-46 snow season, there wasn't one month when rain didn't affect the consistency of the snow.

Wet or dry, it all adds up to an annual snowfall of 150 inches, which is a big pile to remove from either the front walk or county roads.

Despite the heavy snowfall, the varied types of snow, and the unusually long season, however, the 600 miles of highway included in the County's maintenance system are kept open to traffic throughout the winter at a cost of between \$75 and \$150 per mile.

Drift Prevention

The 600 miles of highways, which are maintained under the direction of George W. Koronski, County Highway Engineer, include 118 miles of trunk highways. The roads in the county system are predominantly gravel-surfaced with 28 to 32-foot shoulder-to-shoulder widths, 20-foot wearing surfaces, 4 to 1 shoulder and 2 to 1 back-slopes, and ditches 2 feet deep.

The snow-removal season starts in the early autumn with placement of posts for the 95 miles of slat-type snow fence. During late September and early October, the posts are placed on the north and west sides of the highways, about 75 feet from the center line of the highway. After the posts have been solidly frozen in place, the fencing is hung.

An important aid in preventing drifts from piling up on the highways is the extensive planting of conifers which has been carried on throughout the county. Most widely planted is Scotch pine, which, although not native to the area, is the fastest growing tree. Planted along the 6 miles of T. H. 2 between Bessemer and Ironwood, the trees have materially reduced snow removal over this distance. The Scotch pines are planted fairly close together, about 3 feet apart, and weed themselves out as they grow.

Maintenance Sections

The county is divided into 23 snow-plow sections; a maintenance man equipped with a 2-ton truck, blade, and V-plow is assigned a route of approximately 30 miles to keep open to travel throughout the winter. The maintenance men start out on their routes as soon as 2 inches of snow has fallen. They stay with their trucks until all roads on their routes are open or, in the event of severe storms when blockades threaten the trunk-line highways, until they are called in to assist the centrally located equipment.

"Our best results have been obtained using Ford-Marmon-Herrington 4-wheel-drive trucks with one-way plows

and V-plows," declared County Engineer Koronski. "By getting out with these units early in the storm and staying right on the job, we can keep the roads open and prevent big drifts and blockades from developing."

Snow plowing by trucks is supplemented with the use of two Snogos, mounted on Walter and Oshkosh trucks. The centrally located Snogos go out after the storm to blockades which are developing and throw the snow well off the highway. Between storms, the Snogos are kept busy pushing out the snow as far as possible from the highway to avoid blockades during the next storm.

There is just one operator assigned to each truck unless a helper is needed to operate a wing. On the Snogos,



Scotch pines planted along the shoulders of this main highway in Gogebic County, Mich., prevent drifts from piling up on the road.

however, an operator and assistant are assigned to each unit.

No Main Lines Blocked

Except in 1938, when 32 inches of snow fell overnight, there have been no

main trunk-line highways blocked in Gogebic County since maintenance was turned over to the County Highway Department.

The trunk highways are given first (Concluded on next page)

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County Handles Heavy Snowfall at Low Cost

(Continued from preceding page)

preference, and when a storm continues or increases in severity, trucks are pulled in from the maintenance sections and all efforts are concentrated on keeping the main highways open. During one heavy storm in recent years, no less than 14 trucks operated over a 7-mile stretch of main highway to keep this road open.

Mr. Koronski points to this ability of the County to concentrate large forces of snow-fighting equipment on small sections of trunk highways as one of the important advantages of county maintenance of state roads.

After the snow has been removed from the trunk highways, the main secondary highways are plowed, then the less important county and finally the township roads. One of the problems which annoy the Highway Engineer is the demand of many rural residents who want their roads and driveways opened before the main highways are plowed. However, when such a demand is made on a sickness or emergency basis, Engineer Koronski checks with the case physician; if he verifies the necessity of opening the road, a Snogo is immediately sent out.

Sanding

Throughout the county at 7 division garages, sand treated with calcium chloride at the rate of a sack of the chemical to 1½ yards of sand is stockpiled during late summer and early



This Snogo, one of two owned by Gogebic County, Mich., works on a drifted highway during a storm.

fall. As ice develops on the trunk highways, trucks from the division garages are able to sand the entire 118 miles in between 1½ and 2 hours.

The Plow's the Thing

According to County Highway Engineer Koronski, the type and shape of the snow plow have everything to do with successful snow removal. He contends that there should not be very much curvature or overhang on a plow or the snow just revolves on it.

"A snow plow is simply an elevator," says Mr. Koronski. "It should serve to get the snow up and off the highway as quickly as possible. Snow plows we have built ourselves at our county shop start with a 30-degree angle at the road surface and have no curvature or overhang. We have had outstanding suc-

cess with this type of snow plow."

Friend of the Kids

The County Highway Engineer is a good friend of all the school children in Gogebic County. "Treat me right," he tells them, "and I'll see about giving you an extra holiday." And the County Highway Engineer keeps his word.

Through cooperation on the part of the Superintendent of Schools, who realizes the danger of a school bus iso-

lated on a snow-blocked road, schools are closed at once on a warning from the County Highway Department.

Equipment and Employment

About 65 men are required for the considerable task of snow removal in this northern county. Costs, which total about \$55,000 annually, break down to between \$75 and \$150 per mile.

Equipment used for snow removal on Gogebic County roads includes:

- 7 Ford-Marmion-Herrington 3 to 4-ton trucks
- 4 Mack 5-ton trucks
- 4 Walter 5-ton trucks
- 2 FWD 3 to 4-ton trucks
- 3 International 3 to 4-ton trucks
- 1 International 2½-ton truck
- 3 Dodge 3 to 4-ton trucks
- 2 Dodge 2½-ton trucks
- 2 White 5-ton trucks

These trucks are equipped with V-plows, blades, and wings including:

- 5 Wausau V-plows
- 3 Marquette V-plows
- 3 Virginia V-plows
- 1 North Star V-plow
- 7 Shop-made V-plows
- 3 Frink wing plows
- 9 Shop-made blade plows

The 2 Snogos are mounted on Walter and Oshkosh trucks.

In addition to this equipment, the County also has available for snow removal 6 Caterpillar motor graders with wings and 1 Galion motor grader with a Ross wing plow.

Sand is spread on the highways with 14 sand spreaders, and calcium chloride is applied with an International Harvester chloride spreader.

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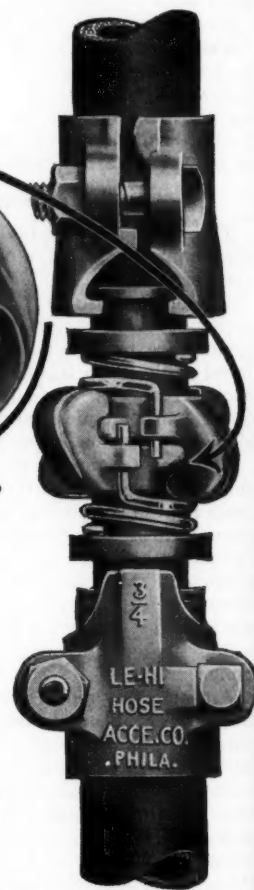
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- ★ No pins
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"While There's Life There's Hope"

Give HOPE to the 1 in every 8 persons now doomed to die of cancer, and to their families as well.

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Air Terminal

(Continued from page 6)

belt conveyors. These belts took the aggregate to stockpiles near the batch plant. Bins were fed by a single 36-inch belt conveyor from a tunnel under the aggregate storage piles. A large-diameter Armco Multi Plate metal culvert was used for the tunnel. An average of 1,750 cubic yards of concrete was batched each day with a record high of 2,350 cubic yards in 12 hours. There were 161,000 cubic yards of concrete in the job.

Four sizes of aggregates were used in the mix and were stored in separate stockpiles. Two unloading hoppers and belt conveyors were built, each one handling the different sizes of aggregate. A transverse belt conveyor at the end of the main conveyor from the unloading hopper received the aggregates; simply by reversing the direction of the belt, material could be stored in either stockpile.

Aggregate storage capacity was approximately 100,000 tons of 2½ to 1½-inch rock; 1½ to ¾-inch rock; and ¾-inch to No. 200 sand. Additional unloading capacity was provided for by the construction of a spur track around one side of the stockpiles.

Ten years ago a railroad man who shipped bulk cement in boxcars would have been an unpopular individual. But the shortage of hopper-bottom cars and cement combined to make Morrison-Knudsen not particular in the least about the method of shipment.

Boxcars were unloaded by a Fuller-Kinyon electric cement unloader. The material was stored in two 450-barrel cement silos until they were full, and then it by-passed automatically into two 2,450-barrel storage silos. Storage capacity for about 5,800 barrels was provided. Approximately 11 cars of cement came in each day, but even with this storage capacity the concrete apron used cement at an alarming rate.

Aggregates and cement were batched through the Noble plant over Fairbanks beam scales. A 1.30-cubic-yard batch, with weight compensated for moisture content, was dry-batched and dumped to the trucks which drove through under the plant. From 15 to 20 of these trucks, mostly Fords and all rented from a private trucking contractor, hauled the batches about a mile out to the paver. From two to three batches, 1.30 cubic yards each, were hauled by each truck.

Concrete Pouring

"Pouring" concrete is, in a sense, a misleading term. At a slump of 1½ inches, concrete is much too stiff to pour. It has to be placed.

Picture a pair of 34-cubic-foot heavy-duty pavers, one on each side of the tremendously heavy slab. Their booms almost interlock. Trucks come flying up the road in a cloud of dust, scream to a stop, and back in to the skips. The dump man pulls the pin on one batch, and almost before the truck can pull

out of the way up goes the skip. The operator bangs it a couple of times to get the dry batch down in the paver.

As the paver operator on the other machine runs a bucket of "mud" out the boom and dumps it with scarcely a splatter, he grins at the man whose batch is tied up for a minute in the

paver. His white teeth shine against a face that is all beard and dust and cement. His provocative grin seems to mirror the challenge of this urgent job.

And he isn't wrong about that challenge. The job had 15,000 feet of Blaw-Knox steel forms, heavy forms that had to be moved and set by a Case-tractor-

mounted Handi-Crane. Workers set them from 500 to 1,000 feet out ahead of the paver, and kept them that far ahead. It was a 25-foot strip they were pouring, and it took 1.4 cubic yards of concrete per linear foot.

Try as they might, the paver opera-

(Concluded on next page)

Something New HAS BEEN ADDED

Now an auxiliary concrete hoist has been provided for use with the Strayer Portable Concrete Plant so that a full 1 yd. batch can be raised and dumped into truck, floor hoppers, or concrete chutes controlled by plant operator. In the plant at right, 12'-6" clearance is provided, under the discharge gate of concrete bucket—greater height can be furnished to order. Now one complete batch of concrete can be discharged into trucks, buggies, etc., while another load is being batched and mixed. Write for complete details.

ERIE STEEL CONSTRUCTION CO.

271 Geist Rd.

Erie, Pa.

ERIE

PORTABLE CONCRETE PLANTS

BUCKETS * AGGREGATORS

TRAVELING CRANES



THE Foolproof RUD-o-MATIC TAGLINE

- ★ Spring tension keeps bucket steady
- ★ No weights, tracks or carriages
- ★ Fewer sheaves saves cable wear
- ★ Easily installed in 30 minutes
- ★ Your Equipment Dealer can supply you

"IT'S THE STURDY

FOOLPROOF COIL SPRING"

McCAFFREY-RUDDOCK TAGLINE CORPORATION

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STERLING LIGHT PLANTS

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CONTRACTORS

SIMPLE—DEPENDABLE—RUGGED
WRITE FOR LITERATURE

STERLING MACHINERY CORPORATION
405 Southwest Blvd., Kansas City

Air Terminal

(Continued from preceding page)

tors couldn't seem to catch up with the fast-moving ground crew. Four men working with the Handi-Crane unloaded forms off a flat-rack truck. They swung them in place. They set them down on a subgrade 12 inches of which had already been rolled to 100 per cent of optimum density before it was covered with a foot of highly compacted rock—2 inches of minus 1-inch on 10 inches of minus 3-inch crushed rock. This rock is a part of the strength and cushion under the slab that's designed to dampen engine vibration.

Four men followed up to adjust the grade under the headers, if it needed adjusting. A man with a little orchard pot slung on a shoulder strap sprayed form oil on the steel forms. One character with a good eye sat astraddle a steel form and made motions in or out to a Mexican swinging a sledgehammer. He flung out his right hand, quick, meaning he wanted $\frac{1}{4}$ inch towards the south. Manuel swung with power behind the sledge. "Whoop! Too much!" yelled the character with the good eye, waving his left hand. "Back a hair!"

You had the same feeling watching them that you have at Santa Anita when the finish is close.

Spaced along the forms at mid-height, a row of 2-inch-round x 8-inch-long dummy dowels were fastened to the forms by screws extending through the forms. These dummy dowels were given a heavy coat of grease to prevent them from sticking to the concrete after it was poured. Before the forms were removed these screws were taken out, leaving the dummy dowel in the concrete. After the forms were taken off, these screws were again placed in the dummy dowels and the dummy dowels removed. A 2 x 16-inch steel dowel was then placed in the hole left by the dummy dowel before the concrete in the adjoining slab was placed. These dowels were given a prime coat of red lead paint before being placed 18 inches apart in all construction joints.

Meanwhile, behind the concrete pavers, a Blaw-Knox spreader with six Viber electric internal vibrators squatted on steel forms. It moved up towards the two Rex pavers every time they dumped a ribbon out in front of it. The vibrators danced with a muffled undertone, and this concrete that had looked so dry a minute before now seemed to sweeten up and flatten off as enough laitance and mortar for the finishers worked up to the top. These vibrators were only about 3 feet apart, and they did a thorough job on the slab. When the spreader went over the slab there wasn't anything left behind but a finishing job.

A Jaeger-Lakewood double-screed finisher, staffed by a construction stiff with a worried look, passed over the slab several times. Back in the early part of the job they built a home-made machine for placing and vibrating the dummy-contraction-joint-groove irons in place. This machine operated immediately behind the Jaeger-Lakewood. Dummy irons disappeared in grooves; later, when the slab had taken its initial set, they were pulled, leaving a dummy contraction joint 4 inches deep in the pavement every 12½ feet. Each was then filled with asphaltic joint-sealing compound.

Nine finishers and two helpers worked with bullfloats and $\frac{1}{2}$ -inch-radius edgers, smoothing the slab and putting a radius on the edge of the dummy joints. Working long after the pours were completed, they put a burlap-wiped finish on the concrete. Then a membrane curing compound was spread on the fresh slabs.

Not for 24 hours were the steel forms taken away. Sometime after that pe-

riod, the form crew and its Case-mounted Handi-Crane came back; hooked onto the pins with a special hook that pulled them; picked up the forms and brushed them off if they needed it; and set them again far enough ahead so that the paver operators could never hope to catch up until the job was finished.

The whole story was there: crews working like mad towards the close of a busy day when they had poured 1,500 running feet of slab; General Superintendent Al Johnson dropping by—a big, casual, slow-talking and friendly Swede—to see that things were moving along properly; the big ATC cargo planes lined up waiting for service, with more and more coming in around sunset, from Tokyo, Guam, Midway, and

Hawaii. You watched this concrete crew work under George Haensel, its superintendent, and you felt that you were seeing a pre-war concrete crew in action again!

Personnel

Ed Campbell was Johnson's Assistant Superintendent; Haaken Neilson was in charge of crushed rock under the concrete; Mark Smith was Master Mechanic; and Dean Anderson was Chief Engineer for Morrison-Knudsen. Other Morrison-Knudsen key men were Asphaltic Concrete Superintendent Ed White; Grading Superintendent Bud Snowball; and Railroad Superintendent K. G. Hunt. Stolte's men were also around; they were expending their talents on concrete buildings.

Colonel Lester F. Rhodes is the Corps of Engineers' District Engineer at Sacramento, and it was under his direction that the new air base was conceived and designed. Some of the old loading theories certainly were elaborated on to produce this heavy concrete. J. R. Morton is head of the Construction Division, and field work is under the supervision of Thomas Kelly, Resident Engineer on the job.

Tire Production

Truck and bus tires are now being produced at the rate of about 1,400,000 a month, as compared to a pre-war monthly output of 725,000 in 1940, the largest pre-war production year, the Goodrich Rubber News Letter says.



... AND COMPETITIVE TESTS PROVE THAT LaPLANT-CHOATE SCRAPERS LEAD THE FIELD IN PROFIT-EARNING PRODUCTION

In the final analysis, *any make* of crawler tractor with sufficient horsepower will do a reasonably good job of handling a scraper. But, when it comes to selecting *the right scraper*, it's an entirely different story. Some scraper outfits get heaping loads in double-quick time. Others take much longer—even with the aid of a pusher. Some will carry a smooth, even spread in high gear, while others are slow and uncertain—especially in wet or bulky materials. Some scrapers make efficient use of tractor power—others burn it up by lugging around "an extra yard of dead-weight" that they never get rid of. (And that's the type of a load you never get paid for.)

The point is—regardless of what tractor you use, there's a *whole of a difference in scraper performance*. And that difference in the scraper can easily "make or break" the profit on a close-bid job. That's why more and more smart dirtmovers are picking up whatever tractors they can get—and standing pat on LaPlant-Choate Positive Forced Ejection Scrapers. Why LPC? Because competitive tests prove that under the varying conditions of scraper operation, LaPlant-Choate's improved rigs consistently deliver *highest average production at lowest over-all costs*. Just ask any recent LPC owner. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.

FIRST in value
because they're
FIRST in
performance

LaPLANT & CHOATE
Positive FORCED EJECTION SCRAPERS

Portable Gravel Plant Has Diesel-Electric Drive

A booklet recently issued by Pioneer Engineering Works covers the company's new 46-VE duplex crushing and screening plant with diesel and electric drives. It explains in detail how the plant is constructed and how the simplified drives are arranged; it gives complete specifications.

Special emphasis is placed on the features which make it possible to secure portability and maneuverability of a high-capacity plant. The reduction in weight and the saving in mechanical maintenance costs said to be accomplished by electric drive, are pointed out.

Copies of the booklet can be secured

by writing to Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn., and asking for the booklet described in **CONTRACTORS AND ENGINEERS MONTHLY**.

Adm. Ben Moreel Assumes The Presidency of Turner

The election of Admiral Ben Moreel to the position of President and member of the Board has been announced by the Turner Construction Co. of New York. As Chief of the Bureau of Yards and Docks of the U. S. Navy from 1937 until the end of the war, he directed the planning and execution of the Navy's gigantic construction program which involved the building of its shore establishments at home and abroad.

Admiral Moreel received his appointment of Rear Admiral at the age of 45, and his advancement at the war's end to a four-star Admiral reflected the high standard of his achievements. He is the only non-Annapolis man to receive the rank of Admiral in the USN.

Admiral Moreel has announced that George E. Horr and William H. Nye, both Vice Presidents of the company, have been appointed members of its Executive Committee.

Studies of travel habits are now in progress in the metropolitan areas of 37 large cities in 22 states. They are being carried on by the PRA, the state, and the city affected, to secure facts needed in planning a solution of urban traffic problems.

Southeastern Highway Officials' Convention

Members Elect Officers; Resolve To Petition Congress to Extend Expiration Date on Federal-Aid Funds for Highway Construction

♦ **OFFICERS** for the new year were announced at the convention of the Southeastern Association of State Highway Officials held in November in Birmingham, Ala. The new President is George T. McDonald, Director, State Highway Board, Atlanta. F. Elgin Bayless, Chairman, State Road Department of Florida, Tallahassee, will be Vice President. Col. M. E. Cox, Chief Highway Engineer, State Highway Board, Atlanta, will be the Secretary-Treasurer.

The convention opened with an invocation, then an address of welcome from the mayor, delivered by a member of his staff. The rest of the first morning session was devoted to speeches by the Governor of Alabama, the Dean of Engineering of the University of Tennessee, two speakers from the Public Roads Administration in Washington, and by Mr. Bayless.

Committee meetings occupied the rest of the first day and half of the second. Committee recommendations were incorporated in a set of resolutions, one of the most important of which concerned the Federal Aid Highway Act of 1944.

According to this act, all appropriated funds which have not been claimed by the states at the end of each fiscal year—that is, on June 30, 1947-48-49—shall lapse and revert to the Federal Treasury. The southeastern officials feel that it is impossible to place these funds under contract within the time period allotted by the Act, due to current shortages and inflation.

They resolved, therefore, to petition the Congress of the United States to extend the date of expiration of these funds at least 12 months after June 30 of each of the three years. Copies of this resolution were sent to the Federal Works Administrator and to the Commissioner of Public Roads. A committee of three members was authorized and appointed to present this petition to the convention of the American Association of State Highway Officials at its Los Angeles meeting in December, 1946.

It was also pointed out at the convention that the highway traffic accident rate has grown steadily since V-J day. Also, this rate is higher in the southeastern section than in the nation as a whole. It was urged that each member state provide personnel, facilities, and funds for carrying out an effective program to prevent accidents through engineering, education, and enforcement.

The need for a long-range master program of road construction, improvement, and design was discussed. Members resolved to urge its promulgation. An illustrated talk on the Inter-American Highway, and a business session, closed the convention.

Tractor-Wheel Cleaner

A tractor front-wheel cleaner is being made by The Yetter Mfg. Co. of Colchester, Ill. Its cleaning blades are designed like the moldboard of a plow in order to remove heavy clinging mud from tractor wheels and from themselves.

The Yetter cleaner is available in several mounting brackets, each designed for a specific make of tractor. It is adjustable, by bolts, both for width and length, and follows the tire contours.

Further information will be forwarded from the company upon request. Mention this report.

THAT MAKES THE PROFIT!



Just ask a
LaPLANT-CHOATE
owner!



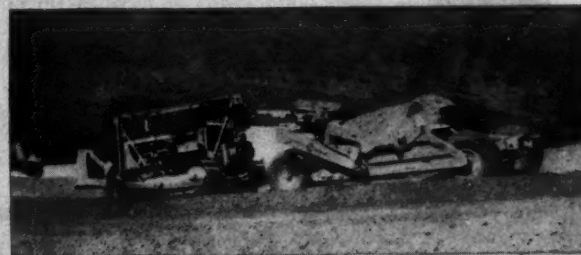
DUNN & CUNNINGHAM ran into a dry glacial clay deposit on this hospital expansion job at Council Bluffs, Iowa. However, their new LaPlant-Choate C-114's handled it easily, averaging less than 1 1/4 minutes per load—without the aid of a pusher. Material was spread smoothly and cleanly in just 20 seconds.



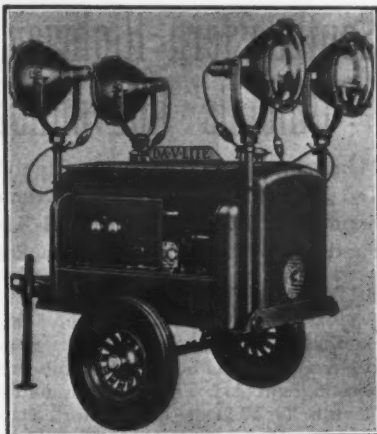
HARRIS CLAY COMPANY uses a combination LaPlant-Choate hydraulic dozer and C-108 scraper for stripping overburden from kaolin deposits near Spruce Pine, North Carolina. Soil is heavy clay—full of rocks and roots—but the C-108 loads and spreads it with ease. Outfit is also available for building and maintaining roads on company property.



J. TOMEI & SONS—Los Angeles contractors found their LaPlant-Choate C-108 ideally suited for this difficult subdivision job in Sherman Oaks, California. Operating in exceptionally wet heavy "dobe," the C-108 got heaping loads in one minute—spread them cleanly in 16 seconds—averaged 20 to 60% more yardage than competitive scrapers on same job.



SANTA CLARA COUNTY, CALIFORNIA, keeps the crusher in their gravel pit operating at full capacity with one LaPlant-Choate C-108 scraper, dumping into a hopper. Smart downhill scraper loading in a well defined trough produces extra big loads of the heavy aggregate, enables the county to operate their own plant at extremely low cost.



This portable Davey unit, equipped with 16-inch 185,000-candlepower floodlights, can be used to light large working areas, or to provide power.

Four Portable Units For Lighting, Power

Production of four new Da-V-Lite portable lighting and power units has been announced by the Davey Compressor Co., Kent, Ohio. The four standard models are floodlight, searchlight, combination, and beacon. All are available in skid and 2-wheel spring trailer mountings. Trailer machines are 9 feet long, 7½ feet high, and 5 feet wide; each weighs approximately 1,750 pounds.

Each Da-V-Lite is built around a 5,000-watt Westinghouse self-excited self-regulated ac generator. The latter is driven by a 15-hp 4-cylinder Wisconsin air-cooled engine, equipped with an electric starter.

Floodlight models are applicable for lighting large work areas. They are equipped with four heavy-duty Westinghouse 16-inch floodlights, providing 185,000 candlepower per light. Each light is individually operated from the control panel and can be raised to a height of 8½ feet.

Searchlight models are suitable for spotting specific restricted areas, nearby or at a distance. Standard equipment includes two Westinghouse 18-inch searchlights furnishing 1,965,000 candlepower per light. Auxiliary transformer equipment is optional to boost the per light candlepower to 3,225,000.

Combination models are designed for both work-lighting and spot-lighting. They have two 16-inch floodlights and two 18-inch searchlights. The beacon

models are for special directional-lighting applications. Each unit has one 24-inch Westinghouse 11,280,000-candlepower searchlight.

In addition to their lighting uses, all four models can be employed in case of emergency, to supplement existing power facilities or to provide motive power for electric tools. Write to the manufacturer at No. Water St. for further information.

Wire-Rope Survey

A survey has recently been completed by the Preformed Wire Rope Information Bureau, in which ten questions about the use and value of preformed wire rope were directed at 8,335 users. The results of the survey are available in a booklet which explains the way the survey was conducted and catalogs the answers.

Copies of the booklet are yours for the asking if you write to the Bureau at 520 No. Michigan Ave., Chicago 11, Ill.

Jack-Maintenance Manual

Now, with all types of equipment hard to replace, extreme care of every tool is the order of the day. A jack-maintenance manual issued by The Duff-Norton Mfg. Co. is intended to give helpful hints on the best care of jacks, and the safest ways to use them.

A jack is designed to be a mechanical muscle. It can lift loads more easily than a man can, provided the right jack is used for the right job. Therefore, says the manual, make certain that you have enough jacks for all jobs, and keep them in a handy place so workers won't do without them or use the wrong one. In case of doubt about the right one, use a jack of greater capacity.

Half of the manual is devoted to specific pointers such as these on the use and maintenance of jacks. The last half is devoted to a discussion, with cutaway diagrams, of the construction of jacks and the use of each type. Definitions are listed of terms used in jack construction. A 2-page spread follows,

on how to select the right jack for a specific job.

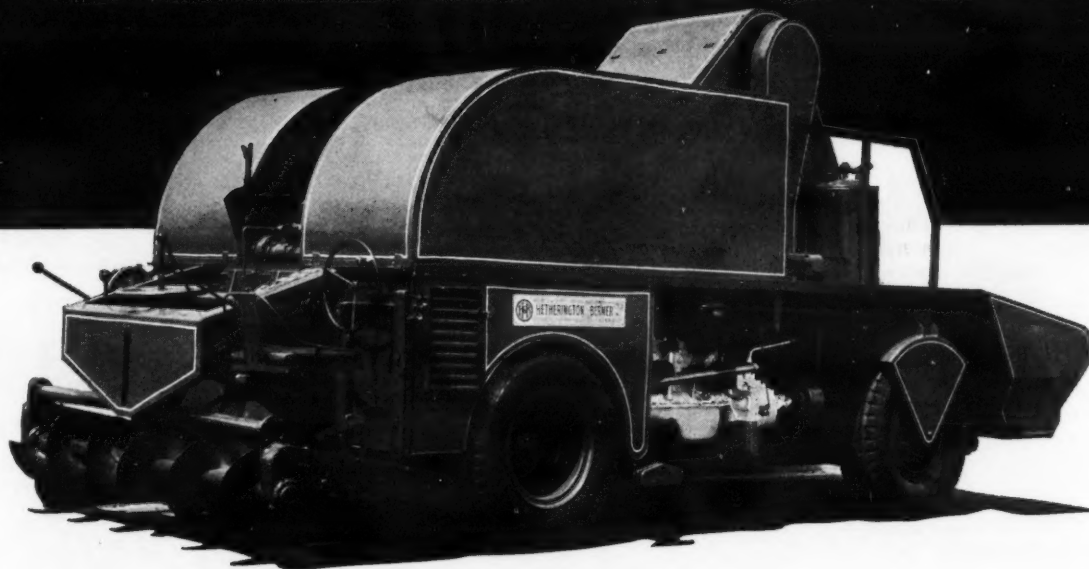
This manual may be obtained by writing to the manufacturer at 2710 Preble Ave., Pittsburgh 30, Pa. Also available are wall posters which list a dozen major "don'ts" for users of lifting jacks. When writing, please mention CONTRACTORS AND ENGINEERS MONTHLY.

Chain-Hoist Bulletin

A catalog describing the complete line of chain and trolley hoists made by the Chester Hoist Co., 1420 Thomas St., Lisbon, Ohio, has recently been issued. This 16-page catalog contains specification tables as well as section and photographic views of the various products. It includes the company's line of I-beam trolleys, and instructions for the care and maintenance of the equipment.

Copies may be secured by writing to the company on your official letterhead. Request bulletin No. G558, and mention this item.

AFTER TWENTY YEARS... A NEW AND IMPROVED METHOD OF DOING MIXED-IN-PLACE WORK



The MOTO-PAVER may be used in either of two ways—by dumping the aggregate from trucks directly into the plant on the road, or by picking up the windrowed material off the road with the special loader unit.



One contractor, after watching the MOTO-PAVER perform, said: "I've been in this business for twenty years and this is the first real improved method of doing mixed-in-place work I've seen."

The MOTO-PAVER mixes and paves as it goes—spreading and laying any type of mixed-in-place bituminous material to any width, thickness and crown condition desired. When the job is finished the MOTO-PAVER can be driven, under its own power, to the next job. Paving speed is 4 to 50 feet per minute, road travel speed up to 25 miles per hour, mixing capacity 100 to 120 tons per hour.

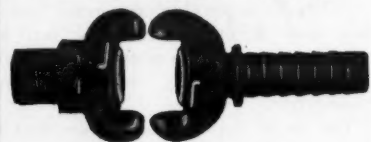
The MOTO-PAVER is especially adapted to resurfacing work on county roads and city streets, but is also highly efficient on new construction. Bulletin MP-46 will be sent on request.

HETHERINGTON & BERNER INC.
731 Kentucky Avenue, Indianapolis 7, Indiana

H&B Moto-Paver
THE COMPLETE TRAVELING MIXER AND PAVER

KELLY HOSE COUPLINGS

TROJON AIR HOSE COUPLINGS
MALLEABLE IRON—RUST PROOFED



UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from ¼" to 1".

QUICK-ACTION — Instantly connected or disconnected with one-quarter turn.

TIME TESTED — DEPENDABLE.
Manufacturer of these couplings since 1921.

Write for Catalogue No. 110

Distributors in most principal cities

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CHICAGO
MACHINERY COMPANY
HOSE COUPLING DIVISION
2524 W MADISON ST. CHICAGO 12



Conversion of unproductive land into crop-producing acreage is being done by contractors in many parts of the country. Here the Ballenger Construction Co. of San Benito, Texas, clears a mesquite-covered section to provide more agricultural and grazing land. Left, a Caterpillar D8 and treedozer clears away a heavy growth, averaging 15 acres in 10 hours, working in third gear. Next, a brush rake on the D8 piles up the mesquite for burning. To dig up roots and stumps in the newly cleared land, a LaPlant-Choate root plow on a D8 was used. Right, W. J. Ballenger and J. D. Ballenger of the contracting firm stop for the camera, with Grant Finley, tractor operator.

Safety Program Must Consider Individual

We need to study human reactions more closely if we are setting up a safety program, says G. M. McAinsh, Eastern Division Engineering Manager, American Mutual Liability Insurance Co. Mr. McAinsh explored this need in an article called "The Human Element in Safety", written for a recent issue of the company magazine.

Everyone instinctively protects himself when danger is immediate, says Mr. McAinsh. But when it is not, and its future prevention is the problem, prudence has to be induced from an outside source. Unfortunately that prudence cannot be induced in a man by mere appeal to his logic. We have to reach his feelings.

Committee inspections, group meetings, and statistic exhibits on safety will certainly convince a man's mind of the need for an accident-prevention program. These bloodless things will make him recognize the problem. But he won't do much about it until we arouse his emotions, his self-interest. He will dismiss the safety measures as meant for the other fellow, unless we can show him that his interests are involved.

Mass directives won't do the trick. We have to approach the man personally—the worker, the foreman, the member of the safety organization, the man at the top. We have to awaken his sense of responsibility on a man-to-man basis, not on an abstract or mass basis.

When we find something we think he ought to correct, we must also find facts and expression with which we can dress them in order to create a sense of need in his mind. What's in it for him? We can't just criticize or recommend. We must understand his responsibilities, what he has to work with, what his orders are, what controls him, in order to understand his side of the question. If we would persuade, we must forget the man's manner and not argue his opinion, if opposed to ours, but search for those things which he can make use of for his own advantage.

If we can, through intelligent instruments of approach, cultivate a man's mental soil and place him in good mind towards us, we have gone a long way towards capturing his emotions and moving him to action—whether in safety programs or just in living.

Engineering Course Opens At Arkansas State College

Arkansas State College at Jonesboro, Ark., is inaugurating a 4-year course leading to degrees in civil, electrical, or mechanical engineering. It is felt by the school administrators that this is an expedient move, due to the current demand for engineering education.

The school, located about 75 miles northwest of Memphis, Tenn., is co-educational. It was first established in 1909; however, most of its buildings have been constructed since 1932 and are of modern design. The campus has

dormitories for men and much additional lodging accommodations for single men on a barracks basis in permanent brick and concrete structures. Applications for 1947 fall enrollment are now being accepted.

Branch Office News

The Independent Pneumatic Tool Co. of Chicago announces the appointment of J. A. Hill, formerly Manager of its New York branch office, as Manager of

electric tool sales. The company also announces the opening of a new branch office in Cincinnati. Howard C. Brown, formerly in the Pittsburgh office, has been appointed to manage the new office at 426-428 Elm St.

Announcement

For the past 23 years Garlinghouse Brothers have been established in Los Angeles as Distributors of Construction and Industrial Equipment in the Southern California Territory.

During the past ten years Garlinghouse Brothers have manufactured a complete line of concrete placing equipment, concrete carts, and wheelbarrows. Due to the growth of this activity, and also due to a recent development in manufacturing of industrial wheels for pneumatic tires, it has been decided to separate the three activities. The independent operation of the three divisions will enable us to serve more efficiently the respective trades.

GARLINGHOUSE BROTHERS

Distributors

Exclusive Distributors in Southern California of Nationally Known Manufacturers of

CONSTRUCTION AND INDUSTRIAL EQUIPMENT

2416 East 16th Street • LOS ANGELES • Telephone JEFFerson 5291

GAR-BRO MANUFACTURING CO.

Manufacturers of

CONCRETE PLACING EQUIPMENT • WHEELBARROWS

CARTS • INDUSTRIAL EQUIPMENT

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GAR-BRO WHEEL COMPANY

Manufacturers of

PRESSED STEEL WHEELS FOR INDUSTRIAL PNEUMATIC AND CUSHION TIRES

2416 East 16th Street • Los Angeles • Phone JEFFerson 5293



For the present, until larger facilities are obtainable, the operation of the three companies will be located at the same address of 2416 East 16th Street, Los Angeles.

Winners of Awards Announced by Moles

Two awards for outstanding construction achievement will be presented at The Moles' annual dinner in New York City, February 5. This New York society of tunnel and heavy-construction men makes awards each year in the form of citations and bronze plaques to one member and one non-member. The winners for 1947 are Thomas Crimmins of the New York contracting firm which bears his name, and Harry W. Morrison, President of Morrison-Knudsen Co., Inc., Boise, Idaho.

Mr. Crimmins has played a major role in the underground-construction development of New York City. He has specialized in foundations, tunnels, ex-

cavation, public-utility substructures, and waterfront work. He joined the Crimmins organization in 1900, after receiving his degree in civil engineering at Harvard University. Four years later, at the age of 24, he became its President. He was active in founding the Harvard Engineering Society, and in 1900 helped organize the Contractors' Protective Association designed to safeguard owners and the public against unscrupulous contractors.

Mr. Morrison started work with Bates & Rogers Construction Corp., Chicago, and later was with the U.S. Bureau of Reclamation. He joined Morrison-Knudsen in 1912 as a partner. When Boulder Dam was up for bidding, he was instrumental in combining a group of contractors to take the job under the

name of Six Companies, Inc. This move set a pattern which has often been followed since on the large projects of the west and during World War II construction jobs at home and overseas.

Bulldozer Bulletins

A new set of bulletins on hydraulic bulldozers for use with Cletrac tractors has been brought out by The Heil Co. The bulletins give complete specifications of bulldozers designed for Cletrac models A, B, D, and supersede all previous announcements.

These data sheets are yours for the asking, together with a list of prices if you write to Heil at 3000 W. Montana Ave., Milwaukee 1, Wis., and refer to this notice.

GALION

GEAR

DRIVE

Assures MAXIMUM TRACTION EFFORT

POSITIVE FOUR-WHEEL DRIVE

The GALION All-Gear Tandem Drive is the most efficient and advanced type of drive obtainable. Power is transmitted equally to all four wheels by means of heavy accurately meshing gears which turn on anti-friction roller bearings. Gears and axles are solid, one-piece, nickel alloy steel—drop forged and heat treated for super-ruggedness.

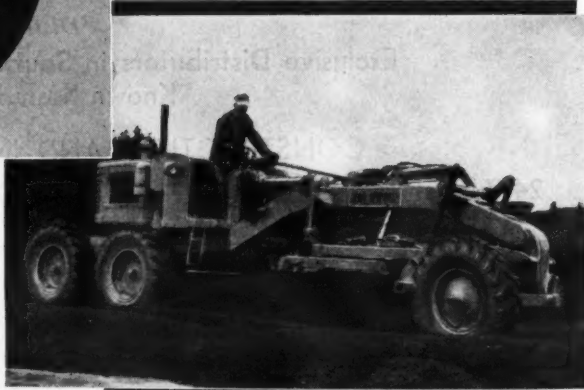
In the GALION 102, the flow of power from engine to drive wheels is smooth, positive, and steady. The All-Gear Drive as used in GALION Tandem Drive Motor Graders, is always a four-wheel drive.

Catalog No. 290 gives complete information—write for a copy today, and name of nearest GALION Distributor.

The GALION IRON WORKS & MFG. CO.

General and Export Sales Offices

Galion, Ohio, U.S.A.



GALION FEATURES THAT ASSURE TOP PERFORMANCE

- Large front tires—Same size as rear . . .
- Combination hand and hydraulic steering
- Rugged box-type main frame
- Gear-type, four-wheel tandem drive . . .
- Full hydraulic control—low pressure system
- Heavy front axle construction
- Blade pressure of 13,500 lbs.
- Powerful, quick-starting, full Diesel motor

GALION

IRON WORKS

hydraulic GRADERS · ROLLERS

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PREMOLDED
EXPANSION JOINT
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FOR HIGHWAYS... DAMS
AIRPORTS... BRIDGES... TUNNELS
and GENERAL CONSTRUCTION

KORK-PAK

ASPHALT

CORK

SELF-EXPANDING CORK

★ KORK-PAK

Non-Extruding KORK-PAK Fiber Joint is a composition of bitumen and cork, prepared between felt strips, and designed to incorporate various desirable qualities.

★ ASPHALT

Premolded ASPHALT Joint is a mixture of asphalt, fiber, and mineral filler prepared between felt strips. The standard joint for use where concrete slabs are not subject to excessive movement, and some extrusion is not objectionable.

★ CORK

Non-Extruding CORK Joint is an excellent type where a construction job requires the consideration of a resilient, non-oozing joint. Specified for use in dams, swimming pools, reservoirs, tunnels, bridges.

★ SELF-EXPANDING CORK

Non-Extruding SELF-EXPANDING CORK Joint is designed especially for concrete slabs that contract beyond their original set.

SERVICISED EXPANSION JOINTS are specified by State Highway Departments and Army & Navy Engineers throughout the country.

Write for further specific information.



SERVICISED PRODUCTS CORP.
6051 West 63th Street Chicago 38, Ill.



BUY BONDS BACK THEM

MARK well this button. It is worn by the men and women honorably discharged from the armed services. Though they are now in civilian clothes, let's not forget their service to our country and to us. They still rate our every consideration.

Equipment Serviced At Maintenance Shop

Accurate Costs Kept on All Repairs at Highway Garage; Trouble Avoided By Periodic Inspections

♦ THE Connecticut State Highway Department garage and shop at Newington is one of eleven such plants scattered throughout the state for the purpose of maintaining in first-class mechanical condition the equipment owned and operated by the Department. At all these shops potential mechanical troubles are anticipated, as much as possible, by periodic inspections which prevent many a breakdown of equipment on the road or at work. An intelligent and comprehensive card system enables a careful account to be kept on all repairs at these shops. It results in lower costs and more efficient care of the equipment.

The Newington shop is located about 6½ miles south of Hartford, the state capital, ¾ mile west of U.S. 5 at the corner of Robbins Avenue and Flagler Street. On a plot of ground 300 feet square the Highway Department has three buildings of its own for maintenance use. Slightly to the north of the site it rents a building which has been converted into a blacksmith shop. The original portion of the main building was a dairy barn, 130 feet deep x 42 feet wide, which was acquired about 20 years ago and made over into a repair shop and garage. Since then wings have been added, and two smaller structures have been erected to the south of the main building. One of these is used for storing equipment and material for the roadside-development forces, while the other is a tool shed.

Equipment serviced at this location includes 51 trucks of various makes and sizes; an Austin-Western power grader; an Austin-Western roller; a concrete mixer; 3 Case tractors; 7 Jacobsen mowers; 2 Nelson snow loaders; a sand spreader; a Worthington 105-cfm air compressor; two 3-inch pumps, a Rex and a Novo; and about 65 passenger cars. The passenger cars are used by the personnel of the Highway Department office in Hartford. Of the trucks, 32 belong to District 5, and 18 to the Engineer Section. The other equipment is all part of District 5's maintenance machinery. The garage itself is operated under what is known as the Property Control Division of the Highway Department.

Main Building and Machinery

The main building is built of wood with a concrete floor and composition roof; it has a second story in the original section supported by Lally columns and given over to storage space. At the front or north end, wooden doors swing to a 10 x 10-foot opening, but at the rear, where equipment is usually admitted, three 10 x 10-foot doors lead into the heavy-truck-repair area. Before being brought inside, machinery to be repaired is first cleaned by a Hypressure Jenny which operates at 120-pound pressure.

Near the front, at the east side of the building, an Ideal coal-burning water-tube boiler furnishes steam heat for the radiators along the side walls. Overhead electric lights augment the natural lighting from the doors and the windows on all sides. At the front end a Yale ½-ton chain-fall hoist is suspended overhead, while at the rear of the building lifting is done on a Yale 1½-ton hoist running down the center of the truck-repair quarters. Along the center line of the floor is a 10-inch grated drain for carrying off water, which also may be conducted into several catch

basins flush with the floor and having connections to the outside.

At either side of the front or north entrance is a 3 x 12-foot wooden workbench, with a sheet-metal top and drawers beneath for storing small tools. On the bench to the right is a Stanley 6-inch bench grinder. The bench to the left is equipped with a Black & Decker ⅝-inch electric drill and a 4½-inch bench vise. Two windows furnish light to these workbenches, which are also outfitted with compressed-air and electric connections.

To the rear of the bench on the west side of the garage is the machine shop, which is well equipped with such items as a Black & Decker ⅝-inch valve refacer; a Stevens piston aligner; a Manley 60-ton hydraulic press; a power



C. & E. M. Photo

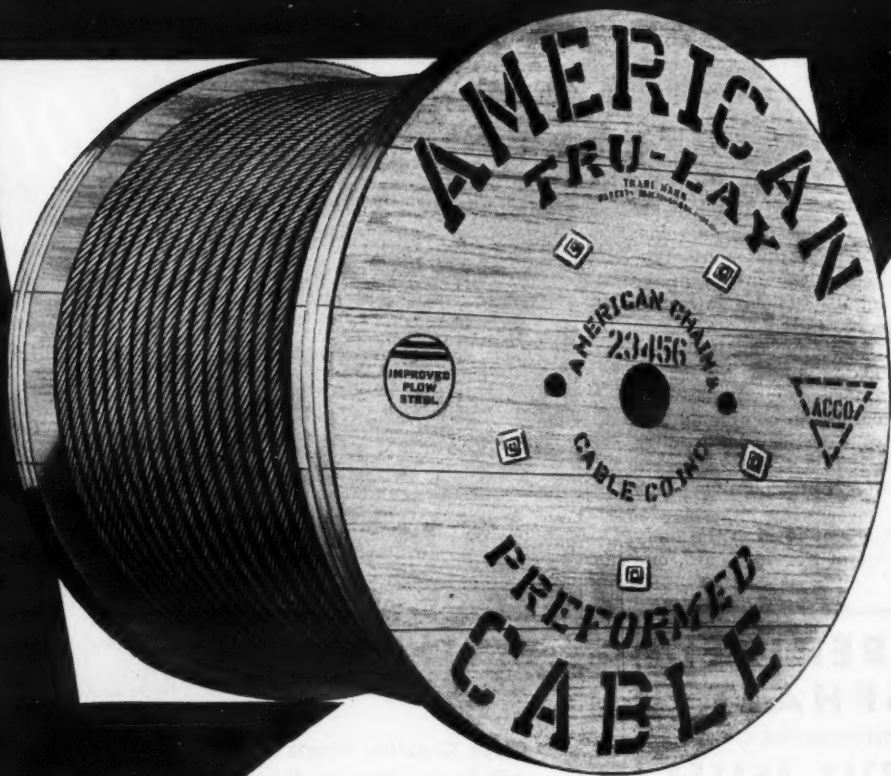
Before being brought inside, machinery to be repaired at the Newington, Conn., Highway Department shop is cleaned by this Hypressure Jenny using 120-pound pressure.

hack saw with a 15-inch blade; and a Standard 12-inch grinder. Overhead an Allis-Chalmers electric motor with a 3-hp rating operates a belt system which is connected to a Bradford 14-inch x 3½-foot lathe, and a Bickford 20-inch drill press. The other machines

have their own individual motors. Additional equipment in this area includes a Champion spark-plug cleaner and tester, a Milford brake-riveting machine, and a Bear wheel aligner and template.

(Continued on next page)

TRU-LAY *Preformed*



CLAMSHELL CLOSING LINES

Operators are proud of what they can do with a clamshell bucket. They like TRU-LAY wire rope for their closing lines because it helps them do a better job. • You might call it "gilt-edge" wire rope... this TRU-LAY. It cuts clean without seizing. It takes the reverse bends and will run longer over small sheaves. When wires do break, they don't turn into barbs that will slice a fellow's hand right through his glove. These are the advantages gained by Preforming TRU-LAY. • Add to this the strength provided by the toughest of Improved Plow Steel wires and you get a rope that will stand the gaff. Ask for TRU-LAY Preformed Improved Plow Steel.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE



Equipment Serviced At Maintenance Shop

(Continued from preceding page)

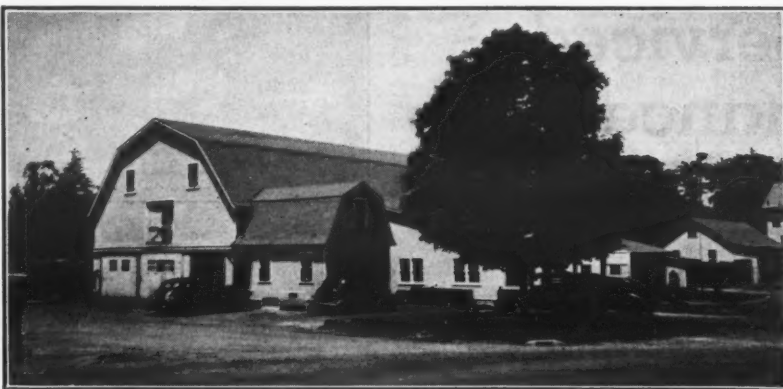
A Look at the Records

Behind the machine-shop layout is the foreman's office. There records are kept covering all phases of the work going on at the shop. They even include the circular sheet which shows the hourly punching of the night-watchman's clock as he makes his rounds from 5 p.m. to 7 a.m. the following morning. The other 17 employees of the shop, mechanics and helpers, have individual time cards known as "Daily Cost Cards" on which they record, by means of the time clock, the time that they start and finish each job. For more facile computing, the clock is subdivided into tenths of an hour instead of minutes. In this manner the labor costs on any repair job are easily figured.

One of the key forms used in the shop is the "Service Order". It is an 8½ x 7¼-inch blank, made out in quadruplicate, which describes the work to be done, with an estimate of its cost. This is the authorization to do the work and is issued by the main office at Hartford. The original or white copy is kept in the shop until the job is finished and then sent to Hartford. Material is requisitioned on the reverse side of this blank. A yellow copy also is sent to the Central Office, a blue copy is kept in the shop, and a pink one is sent to the State Equipment Inspector. All four blanks have the same order number.

With each "Service Order" a card of "Repair Shop Instructions" is issued to the mechanic doing the job and placed in the rack with his time card. At the top of this card, 11¼ x 4¼ inches, are noted the date, service-order number, speedometer reading, equipment number, name of mechanic, and the date the work is completed. Below in two columns are listed 83 possible operations. In a box on the same line with the operations to be done under this service order, an L is marked; when the work under each heading is completed, the mechanic draws a vertical line through the L changing it to a 4. In this way a positive check is obtained over each type of work.

Another important form is the daily "Equipment Out of Service" card, one



C. & E.M. Photo

Equipment to be serviced at the Connecticut Highway Department's Newington shop is usually admitted through these doors at the rear or south face of the main building, opening onto the work yard.

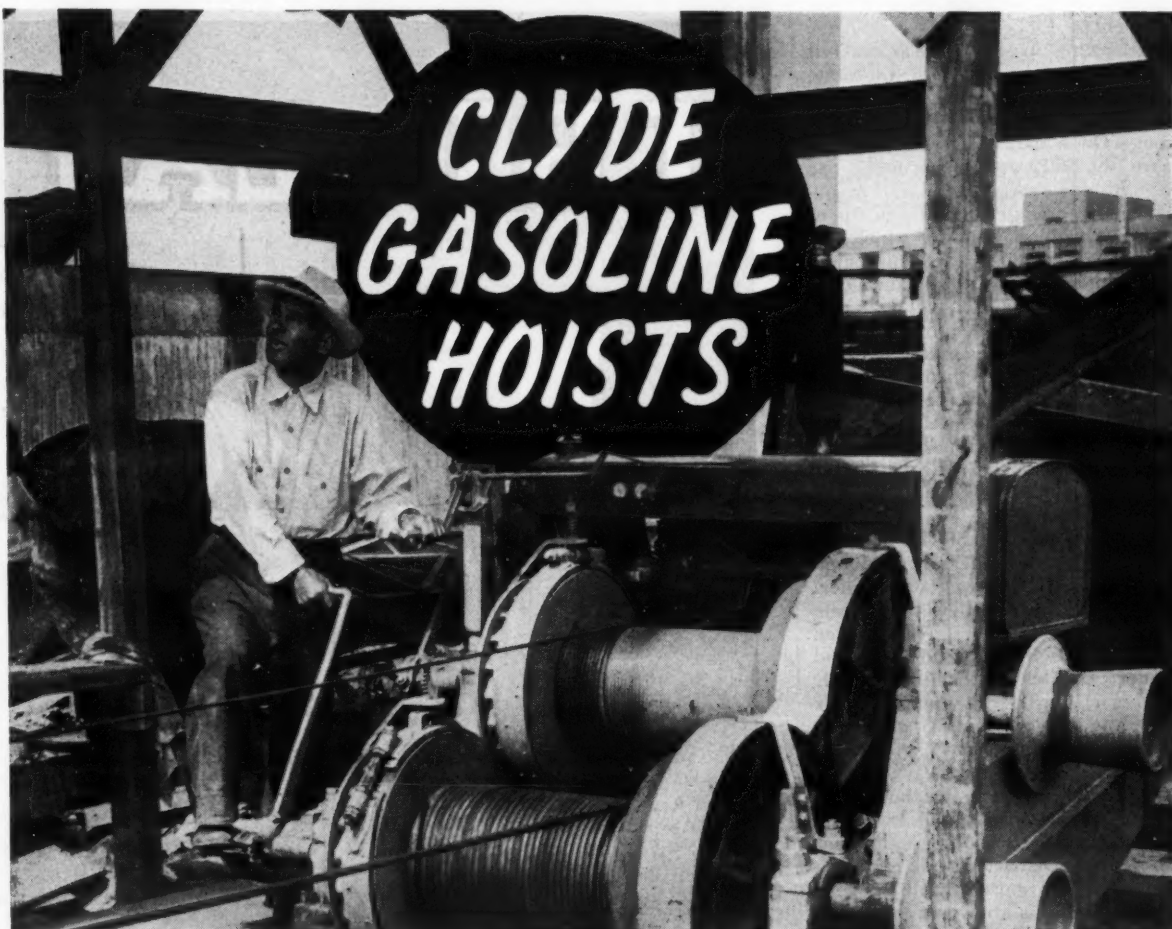
copy of which is sent to the Central Office and the other retained in the shop. This form has three headings: Under Repair, Unserviceable, and Available for Transfer. All three call for the equipment number, and the first

heading also shows the service-order number. If the equipment cannot be serviced, the reason is given; if the equipment is not wanted for service within that district, then the date it is available for use elsewhere is indicated.

Thus the Central Office can tell what equipment is laid up, and has ready access to a brief statement of its case history.

A mileage record for each car and truck is kept on a form entitled "Statement of Travel Performed With State-Owned Automobile". This indicates speedometer readings at the beginning and end of the day's work, with spaces for the entire monthly mileage by days. In logical sequence to this form is the "Preventive Maintenance Check-Up Report": one for a 1,000-mile period listing 30 items to service, and a second for a 5,000-mile period, at which interval 36 different maintenance operations are performed. These two forms are in duplicate; the blue original is kept in the shop while the yellow copy is sent to Hartford.

At the middle and at the end of each month a "Semi-Monthly Labor Report" is made out, based on the summary obtained from the daily cost cards. This is issued in duplicate, the white original (Continued on next page)



Clyde Gasoline Hoists on your job assure better building schedules . . . materials and supplies will be handled rapidly and economically with less danger of costly shut-downs.

Clyde Hoists are quality hoists all the way through . . . they are scientifically engineered for easy operation and efficient service. The best quality materials obtainable; careful and accurate workmanship combine to make them safe, dependable and long-lasting.

The illustration above shows the construction of the Famous-Barr Relay Station in St. Louis, Mo. Erection work is being done by the Westlake Construction Company. Mr. Les White is general superintendent for this company.

The concrete work, building forms and pouring concrete, was sub-contracted by H. A. Dailey, Inc. with Mr. Earl Hodson as job superintendent. H. A. Dailey, Inc. purchased two Clyde Gasoline Hoists to help speed-up building schedules.

On your next job, check the advantages of Clyde Equipment. Write for special bulletins on any Clyde item.

HOISTS . . . DERRICKS . . . WHIRLEYS . . . CAR PULLERS . . . HAND POWERS
BUILDERS TOWERS . . . DECK MACHINERY . . . TANDEM ROLLERS . . . LOGGING EQUIP.

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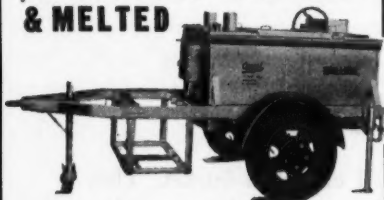
CLYDE IRON WORKS, Inc.

Duluth 1, Minnesota

RUBBERIZED ASPHALT

(FEDERAL SPECIFICATIONS SS-F-336)

CORRECTLY HEATED & MELTED



UNDER AUTOMATIC THERMOSTATIC CONTROL

New Double-Vat indirectly heated thermostatically controlled Kettle meets all State and Federal Specifications for melting "rubber sealers." "No more inconvenience or loss of time than if we were using ordinary asphalt!" writes one enthusiastic user. "Poured 11,000 feet in one day," reports another who used one kettle to complete a difficult 84,000-foot contract with time to spare. Endorsed by leading compounders. Send for FREE eight-page profusely illustrated Bulletin 810CE containing "on the spot" photographs, helpful suggestions, complete specifications, etc. Write TODAY.

AEROIL PRODUCTS CO.

3775 Park Avenue

WEST NEW YORK, NEW JERSEY

Equipment Serviced At Maintenance Shop

(Continued from preceding page)

going to the Central Office and the yellow copy remaining at the shop. Material records are also carefully summarized so that each gallon of gasoline, oil, or alcohol is accounted for. In order to avoid too much bookkeeping for minor repairs, any job which is estimated as under \$10 is recorded directly on the time cards. On jobs over \$10 the costs are kept on a numbered service order.

Besides labor and material cost records, another important file contains a folder on each piece of equipment which is serviced at this shop. In the folder is a sheet containing the name, number, year, and model designation of each unit, with its daily mileage recorded, and the total cost and nature of its maintenance and of any repairs. The different types of equipment are given key numbers, such as 2- for trucks and 12- for tractors; the individual unit's own number comes after the key.

Truck Repairs

Next to the foreman's office where all the records are kept is the tool room. There small tools, such as a Sioux valve-refacing outfit, are stored, along with small parts like taps and dies, bolts, screws, and washers. These are dispensed to the mechanics, and are charged against them until they are returned.

The large area at the rear of the main building, which is given over to truck and heavy-equipment repairs, has two Weaver 20-ton floor jacks. Along the west wall is a 3 x 45-foot wooden workbench with air and electric outlets and a couple of bench vises. Chains are repaired here on a hand press and then hung up on the opposite wall ready for use during the winter storms.

Curtains can be hung up at the south end of the shop to form an enclosure for painting operations. An exhaust fan framed into the west wall draws off the fumes and spray. In good weather the painting is generally carried on outdoors. Spray painting is done with Binks guns equipped with long hose to reach outside the shop if necessary.

Remainder of Shop

A stock room with storage area occupies a wing with a 32-foot front and a depth of 66 feet on the west side of the main building. Such bulk items as oil drums, bag cement, plow blades, etc., are stored here in the north half of the wing, which is entered through a 10-foot sliding door in the north wall. A platform eases unloading of these heavy supplies. The stock room also carries items of replaceable supplies for trucks, such as batteries, spark plugs, cartridge filters, etc.

On the opposite side of the building, adjoining the east wall, is a wing with a 30-foot front and a 55-foot depth. This is given over to small car repairs. Be-

low the window level along the east wall is a metal-top workbench, 3 x 35 feet, equipped with three bench vises and a 6-inch bench grinder. Other equipment includes a gasoline-consumption tester, a Weaver headlight tester, a Bendix wheel aligner, and a United Motors Commentator for testing

coils, condensers, and other electrical parts of cars. This wing has room for five cars.

In a 45 x 35-foot wing directly to the rear is the service room, entered from the outside through two 12 x 12-foot doors and connected to the main shop by a 15-foot door. A Weaver hoist in

the floor lifts the equipment in the air for greasing either with a Lincoln air gun or a Balcrank manually operated gun. A Handy battery charger can charge twelve batteries at a time. This room sees plenty of service in the way of tire changes, dispensing of oil, greas-

(Concluded on next page)

Gulf Quality Lubricants and Fuels

help contractors keep ahead of schedule
on big track relocation project



The Hunkin-Conkey Construction Co., and Shofner, Gordon & Hinman combined equipment and personnel to handle the relocation of tracks on the Conemaugh Division of the Pennsylvania Railroad. The tracks must be moved to make way for a new flood control dam on the Conemaugh River near New Alexandria, Pa.

THIS \$4,426,000.00 track relocation project is one of many important rush jobs where Gulf quality lubricants and fuels work as a team to help contractors make faster progress, higher profits!

Here's why so many leading contractors are partial to Gulf products: They have found that Gulf lubricants provide a higher degree of protection to equipment that's pushed to the limit—and that Gulf fuels are of a uniform high quality that insures maximum engine performance. Result: fewer delays, more efficient operation, lower maintenance costs, and jobs finished ahead of schedule.

Write, wire, or phone your nearest Gulf office today and arrange to use Gulf higher quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.

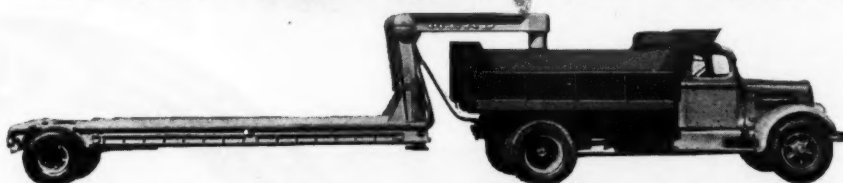


Gulf Oil Corporation Gulf Refining Company

Division Sales Offices:

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The New MEAD Semi-Trailers



- Designed for transporting construction equipment
- Single or trunnion axles—four and eight wheels

- Fits in all dump truck bodies
- Frames of electrically-welded structural shapes—capacities 10 to 25 tons.

We also manufacture conventional Goose Neck Trailers for tractor operation.
Write for information to:

MEAD Machine and Iron Works, Inc. 606 Lexington Avenue, WARREN, PA.

Are your copies of C. & E. Monthly coming to the right address? Would your home address be better—or a field address if on a long assignment? Our Circulation Dept. will change your stencil as often as need be. Just drop a card and let us know.

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue
New York 16, N.Y.



Equipment Serviced At Maintenance Shop

(Continued from preceding page)

ing, etc. It is particularly useful in the winter, for such operations can be carried on in it without having to move equipment into the main shop building, when the opening of the big doors would be a discomfort to the men working inside.

Outside of the service room, gasoline and kerosene are dispensed from pumps connected to underground tanks containing 1,000 and 500 gallons respectively. At the northeast corner of the shop is a 6 x 6-foot hose house containing a Buffalo 40-gallon foam fire-fighting machine mounted on a 2-wheel carriage so that it can readily be wheeled to any part of the shop or yard should a fire break out. Added fire protection is given with 600 feet of 3-inch hose line.

A 25 x 15-foot wing at the southeast corner of the shop is occupied by the maintenance supervisor for the district, with two clerks.

The second floor of the main shop section is given over to storage for the most part, although the front west corner is going to be fitted out with lockers for the shop crew, and a sink and shower installed. Present toilet facilities are in a wing off the east side of the building.

Needed carpenter work is carried out on the second floor with hand tools, though the shop is hopeful of obtaining a power saw which would speed up the work. The air compressor for the shop is located here, a Kellogg-American unit furnishing air at from 125 to 155 pounds per square inch. Among the stored items are tires, sand spreaders, drums containing alcohol—which is piped down to the first floor for convenient use—tar remover, and Gunk cleaning solvent. Also kept on this floor is a Federal-Mogul bearing-oil leak detector which works on compressed air.

Other Buildings

At the south or rear end of the building is the storage and work yard, unpaved but well drained with ten catch basins and a 15-inch tile pipe to carry away storm water. A useful service truck to the garage is a Studebaker equipped with a winch and a telescoping tripod at the rear, capable of lifting loads up to 2½ tons. This unit is employed in fitting plow blades to trucks, or for handling trees in roadside-development work. Maintenance tools are stored in a 10 x 30-foot wooden shed.

About 80 feet to the rear or south of the main building is a 30 x 60-foot corrugated-metal shed with a concrete floor, known as the roadside-development storage building and garage. This building has four doors, two on each side of a small office, and houses tree-spraying machines, power mowers, and saws. It also contains a 30-inch grindstone, driven by a G-E ½-hp motor, on which the cutting tools are sharpened.

The one rented building is a 30 x 52-foot wooden shed with a concrete floor. Half of the space is given over to repairs of heavy equipment or constructing special parts, while the other half is

used for a blacksmith shop. The shop contains a 3½-foot-square forge, a 150-pound anvil, and a workbench with a 6 and a 4-inch bench vise. Welding is done either with an oxyacetylene unit, or a Miller 300-amp electric welder.

Personnel

H. C. Bolles is Garage Foreman at the Newington shop of the Connecticut State Highway Department, which is headed by William J. Cox, Commissioner, with Arthur W. Bushell as Chief Engineer.

Bulletin on Snow Removal

A timely bulletin has been made available by the Caterpillar Tractor Co., Peoria 8, Ill. It describes the use of tractors and motor graders with auxiliary equipment for keeping highways clear of snow and ice. The pamphlet features photographs of diesel-powered equipment working in deep drifts and city streets.

To obtain this catalog, write to the manufacturer and request bulletin No. 9779, "Blasting the Blizzards".



Everybody has commented on the really beautiful four color illustrations contained in the VICTOR Bulletin Form 20 ... it covers fine welding and cutting equipment ... it will be yours, free, for the asking. Write us today for your copy.


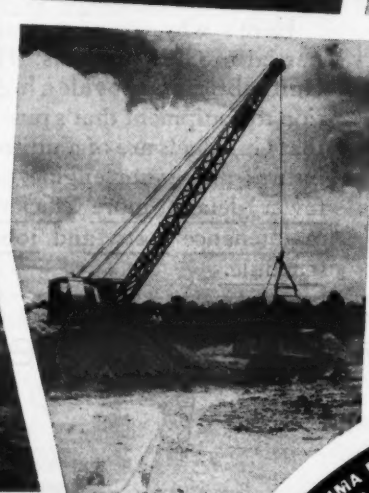
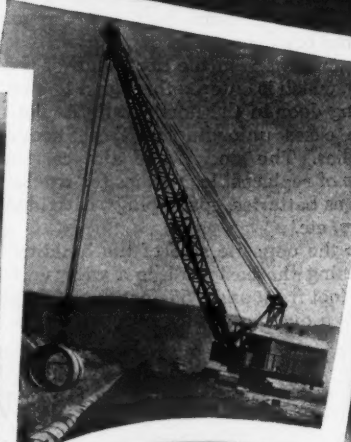
VICTOR EQUIPMENT COMPANY • 844 FOLSOM ST., SAN FRANCISCO 7, CALIF.

\$

Again in 1947

LIMA enters 1947 the pacemaker among shovels, draglines and cranes. Efficient high speed operation of LIMA machines continues to smash performance records everywhere. In brick plants, quarries, sand and gravel pits, coal and metal mines, lumber, general construction, etc., LIMA is giving the kind of service that users want—service that steps up production and delivers big output at low cost. LIMA shovels are built in capacities ranging from ¾ yard to 5 yards and crane capacities range from 13 tons to 100 tons. Bulletins sent on request.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division
Offices in Principal Cities
LIMA, OHIO, U. S. A.

THE LIMA DIAMOND FOR 75 YEARS AN EMBLEM OF QUALITY WORKMANSHIP

LIMA

SHOVELS DRAGLINES and CRANES

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Fight Three Floods On RR Bridge Job

**Heavy Rains Many Miles
From Site Flood Cofferdams;
Fast Work Prevents Loss on
\$130,000 Contract**

ONE of the most ironic construction situations of 1946 befell Rue Construction Co. of Bismarck, N. Dak. The firm was contractor on substructures and piers for the bridges on the Kurtz-New Salem relocation of the Northern Pacific Railway. (See C.&E.M., December, 1946, page 1.) Rue's \$130,000 project was flooded by high water in the streams three different times, while earth work adjacent to his bridges was not even seriously hampered.

Rains falling several miles above the job sent flash floods down two of the main streams which intersect the new railroad line. The resulting high water forced the contractor to move out all construction equipment in a hurry, with only minutes to spare before the stream, rising 3 feet an hour, roared down through the bridge foundations.

The Rue contract included concrete footings and foundations for the structural steel which will carry Northern Pacific trains across these streams. The bridges are in a way radical in their design, for the abutments are light and rest on piles driven all the way through the fill into the subsoil beneath it. In order to get this extreme penetration it was necessary to use a Buda-powered drilling rig to dig a hole through the main fill. Penetration in subsoil was then secured by driving.

Wood piles from 30 to 60 feet in length were used for foundations, and the bearing capacity was figured at the hammer, employing the ENR formula, for 50 tons per pile. They were driven by a 3/4-cubic-yard Osgood machine with a 55-foot boom and a set of swinging leads. A McKiernan-Terry 10B3 pile hammer with a 50-hp steam boiler was used for driving. A 4,200-pound drop hammer was also used.

A cofferdam of steel sheet piling was driven around the pier plan and unwatered by a Jaeger 4-inch pump. The foundation piles were then driven. It was at this stage that high water caught one of the bridges three times. As fast as the cofferdam could be pumped out and cleaned, the stream again came up to flood the place. This happened within

a period of about three weeks. Fortunately no equipment was lost, and form lumber had not yet been set in place.

Concrete Form Work

By wisely making a purchase of lumber earlier in the season, Rue Construction Co. had enough of that vital material on hand to form the bridge piers. The forms were made up on the job by carpenters who worked the boards from piles near the piers. Shiplap 1 x 10-inch boards were used for form facing, nailed to 2 x 4-inch studs at 16-inch centers. These studs were braced by double 2 x 6-inch wales, and secured by Williams steel rods and wing nuts. The steel rods passed through the pier, and stayed in the concrete when the wing nuts were unscrewed at the time



C. & E. M. Photo

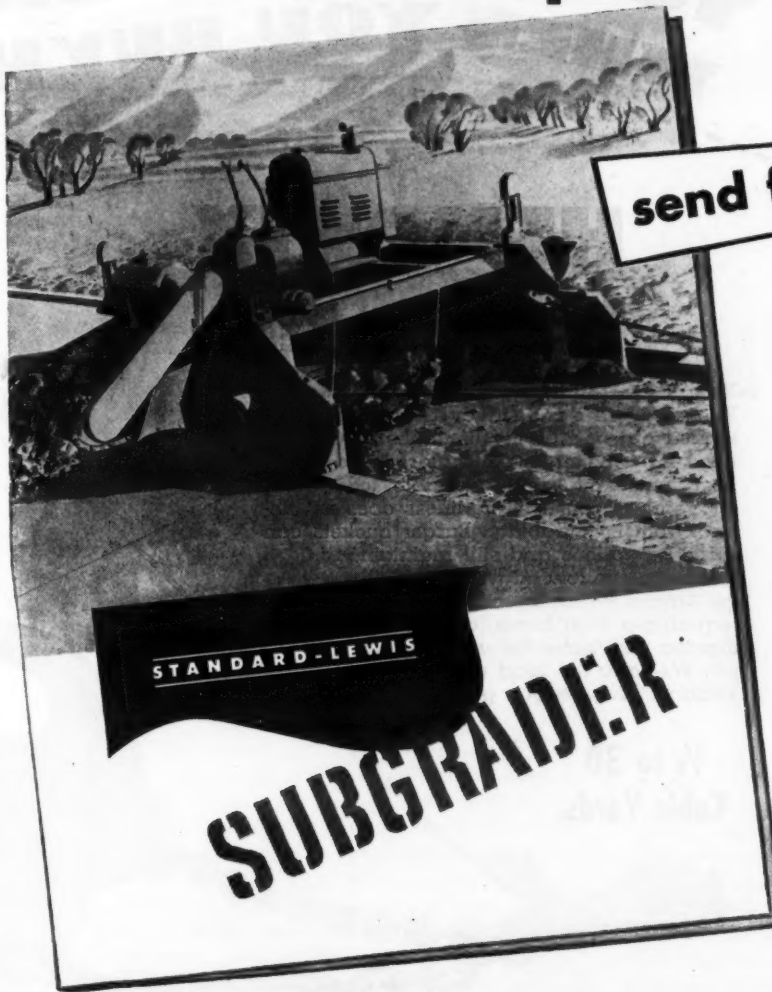
This overall view shows concrete placing on the bridge piers. Steel towers on top of the piers will carry the weight of the bridge girders.

a form was stripped.

Concrete was mixed on the job by a

CMC 3-bag mixer. A Rex and a Koehr-
(Concluded on next page)

For Complete Facts



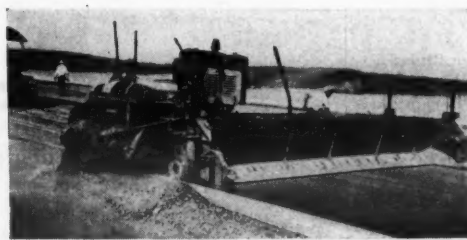
The many unique features embodied in the new Standard-Lewis Subgrader come as a result of design by practical paving equipment engineers. These men know well the problems encountered and have built into this machine many practical improvements that save contractors, time, labor and money.

The new Standard Steel 8-page folder covers in detail all information relating to the efficient operation and economy provided by this ingenious Subgrader.

A request on your letterhead will bring a copy promptly.



This is an example of deep cutting into tough material—gravel as large as 14" in diameter is handled with ease.



No chipped or broken edges of concrete pavement is experienced with the solid rubber tired wheels you can use on the STANDARD-LEWIS Subgrader.

OTHER STANDARD PRODUCTS

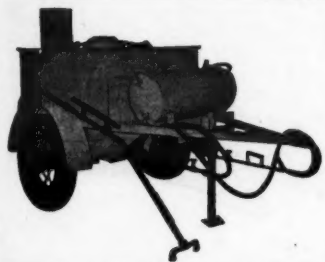
ASPHALT PLANTS

BATCHING PLANTS

ASPHALT FINISHERS

DRYERS

CONCRETE FINISHERS



HEATING KETTLES

FOR ASPHALT AND TAR
Fire Proof—Oil Burning
Hand and Motor Driven Spray

Other Products

CONCRETE VIBRATORS

Gasoline Engine and
Electric Motor Driven Models

FRONT END SHOVELS

for Industrial Tractors

AGGREGATE DRYERS

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C. & E. M. Photo
This view shows form work details on the Rue Construction Co. contract for bridge substructures on the Northern Pacific Railway relocation.

Fight Three Floods On RR Bridge Job

(Continued from preceding page)

ing 2-bag mixer were used on headwalls. (The Rue Construction Co. had also job-contracted about 1,600 cubic yards of headwall and culvert concrete from the two grading contractors.) The aggregates and sand were hauled by wheelbarrows and weighed on a scale at the mixer. Sack cement was added at the mixer. Concrete specifications of the Northern Pacific Railway call for 1 part of cement, 2.3 parts of sand, and 3.7 parts of aggregate, with a water content not to exceed 6 gallons per sack of cement, including moisture in the aggregate.

As the concrete was mixed, it was hoisted to the pier forms by a Manitowoc $\frac{1}{2}$ -cubic-yard crane or by a $\frac{3}{8}$ -yard Speeder. Vibration was done by five Malls. Anchor bolts for structural steel were embedded and securely tied, and the bolt heads were checked by a template before pouring started.

Rue Construction Co. also had available a 21-cubic-yard Johnson batching bin and a Koehring 27-E paver for some of the heavier work. Total yardage of concrete in the Rue job was slightly more than 4,000 cubic yards.

Pouring with any of the small mixers was generally done at a rate of 12 cubic yards an hour. This kept a labor gang of eight wheelbarrow men busy hauling the sand and rock to the machine.

Sand and rock sieve sizes for this concrete were as follows:

SAND		
Sieve Size		Per Cent Passing
No. 4		100-98
No. 8		95-85
No. 16		80-63
No. 30		60-40
No. 50		30-12
No. 100		7-0
ROCK		
Sieve Size		Per Cent Passing
1 $\frac{1}{2}$ -inch		100-95
$\frac{3}{4}$ -inch		70-50
$\frac{3}{8}$ -inch		25-10
No. 4		4-0

Personnel

The bridge piers were under the scrutiny of two regular bridge inspectors, and were built under the direction of D. H. Shoemaker. Ben Nelson was the Job Superintendent for the contractor. The completion date for bridge piers was set for November 15, 1946. The structural-steel work will be done under another contract.

Sprague Joins CSPA Staff

The Clay Sewer Pipe Association, Inc., of Columbus, Ohio, announces the addition to its technical staff of Joshua M. Sprague. Mr. Sprague is to be Dis-

trict Engineer representing the Association in New York State and on the Atlantic coast, with his office located at 26 Court St., Brooklyn, N. Y.

Loader to Fit Tractors

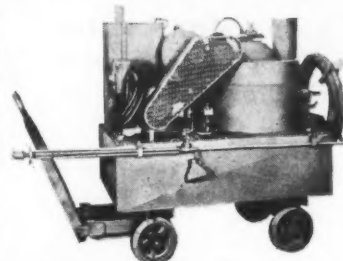
A hydraulic power loader for use on wheel tractors is described in a catalog issued by the New Holland Machine Co., New Holland, Pa. The attachment can be fitted with a 14 x 42-inch shovel, as well as a V-shaped snow-plow blade and a flat-shaped dozer blade, both 20 inches x 7 $\frac{1}{2}$ feet.

The loader is hinged to the rear axle of the tractor. The lift frame is actuated by a master hydraulic cylinder which is supplied with oil from a pressure pump driven by the tractor motor. The overall lift is 7 feet 4 inches; it can be stopped and held for dumping at any height, the manufacturer says. The loader weighs from 620 to 825 pounds according to the equipment furnished.

To obtain a copy of bulletin No. 702, write to the company.

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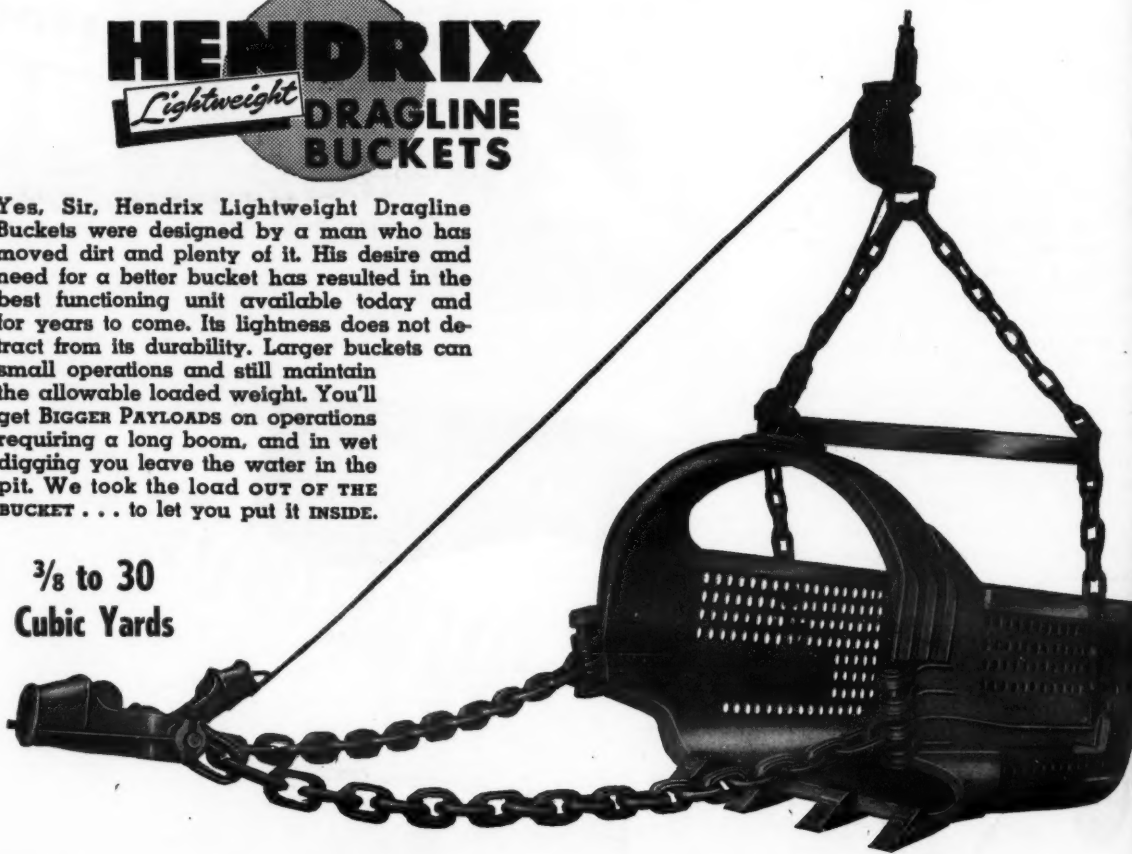
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Cubic Yards**



COMPARE THESE FEATURES

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ Full Pay Load every trip, even in wet digging.
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Plant-Mix Black-Top For Resurfacing Job

14-Year-Old Asphaltic-Concrete Highway Gets New 2-Inch Surface of Bituminous Mix

♦ ONE day last year, two engineers of the Missouri State Highway Department drove over U. S. 54 south of Jefferson City to make a decision. When their official car rolled off the end of the concrete slab north of Eldon to the asphaltic-concrete pavement laid down in 1932, they found the black-top surface rough and washboard in character. The surface was slick with asphalt that had bled up out of the pavement.

"Well, that's that," said V. B. Saville, Division Engineer. "Let's resurface this as soon as we can."

Today that resurfacing job is done. Work began August 14, 1946, on the 14-mile section (2 miles of the 14 were exempt, having been resurfaced in 1940) extending from a point 2 miles north of Eldon south towards Bagnell Dam. The \$132,000 State Highway Department contract was pushed to completion by the Bridges Asphalt Paving Co. of St. Louis, Mo.

Washboard conditions in the existing 22-foot pavement were probably caused by excessive traffic on this main thoroughfare to the resort sections of the Bagnell Dam reservoir. While the road lies in hilly terrain with sedimentary limestone everywhere, much of the subgrade under the old pavement was Missouri clay, high in fines and low in plastic-index rating. The earth shoulders on both sides of the pavement varied in width from 5 to 10 feet, with warning marker posts on the curves.

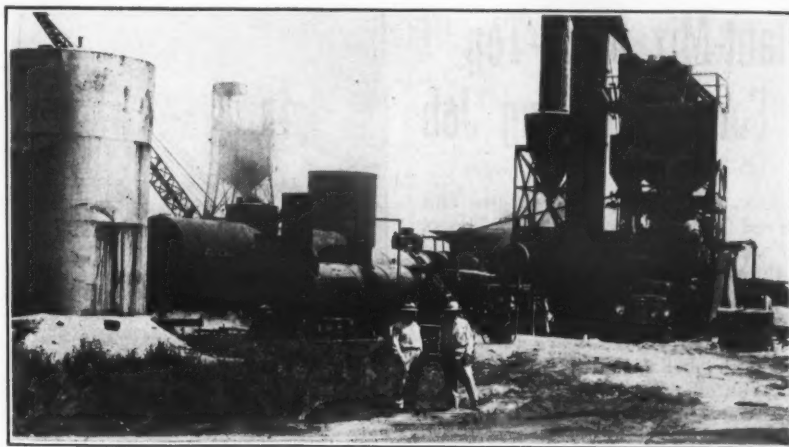
The Bridges paving contract called for resurfacing 12 miles with two 1-inch courses of plant-mixed bituminous material. (In some locations where surface variations in the old pavement made it necessary, the leveling course was thicker than an inch.) The job involved some 22,000 tons of black-top at a contract price of about \$6.10, which included spreading, raking, and rolling. A 12-inch extension was made to the Barber-Greene finisher so that this machine, with a normal paving width of 10

feet, could lay an 11-foot course. Two such courses would reach across the roadway.

A flurry of maintenance activity by state forces in the spring of 1946 preceded the start of work on this contract. The forces filled up any holes and did any necessary patching or strengthening of the existing surface. When Bridges Asphalt Paving Co. moved its machines and men to Eldon, it found the road crowded with traffic but ready to receive its treatment.

Traffic Control

As a matter of fact, the control of automobiles was one of the job's most acute problems. The only way this situation could be handled was to lay one of the strips while traffic used the other



C. & E. M. Photo

The Hetherington & Berner hot-mix plant used on the 12-mile Missouri resurfacing contract is shown here at the right. At the left is the 12,000-gallon tank used to store fuel oil for the boiler fire.

lane. This system made it necessary to station flagmen at each end of a 1,000-foot section.

The flagmen's orders were to pass a

line of cars through this lane, giving a red flag to the last car in the line. When this automobile driver reached the other

(Continued on next page)

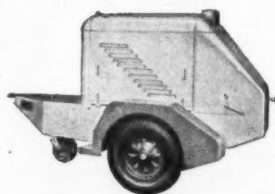
Easy Flow

—SAYS LITTLE JOE

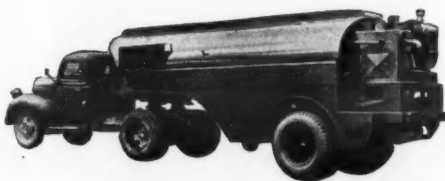


Fast, economical, efficient spraying of all kinds of asphalt and oils is what makes Littleford Spray Master Pressure Distributor so admirably adapted to big time operation. It has: (1) Instantaneous single valve control—an exclusive feature. (2) Full Circulating Vacuum-Flow Spray Bar (up to 24 feet wide) which assures even starting spray and nondrip shutoff. Vacuum-Flow system sprays all materials, from heaviest penetration asphalt to lightest road oils. (3) Heat Chamber keeps valves

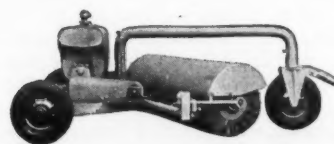
and pipe lines warm. (4) Piston Check Valves can be cut off individually, for spraying difficult widths—no removal of extensions, no use of blank plugs. (5) Atomizing Low Pressure Burner produces more heat than two Torch Burners. The Spray Master line includes many models other than the one pictured. Ask for Bulletin 14. Littleford supplementary equipment includes Tanker Heater, Road Brooms, Spray Tanks, and a variety of Maintenance Units, for making roads better.



TANKER STEAM HEATER No. 115 is fastest steam producing unit on the market for heating tank car contents for unloading. Completely automatic, safety factors. Ask for Bulletin 21.



LITTLEFORD SUPPLY TANKS are the life line of black top jobs, supplying hot and cold materials while operating equipment works without interruption. Ask for Bulletin 25.



LITTLEFORD BROOMS are power or traction driven. Hydraulic lift regulates tension, saves brush. Can be equipped with blowers or sprinkler. Ask for Bulletin 19.



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EMBURY MFG. CO., WARSAW, N. Y.

Plant-Mix Black-Top For Resurfacing Job

(Continued from preceding page)

flagman, he was supposed to give him the red flag; then he, in turn, could pass his waiting cars through. On the face of things it looked simple.

But there is a perverse streak in the average individual on vacation. He, and she, react in various ways to a construction-job flagman, but in any case they run off with the red flags. George C. Lowry, the Job Superintendent, has a piquant explanation for this need on the part of the public for red flags, particularly when the automobile is occupied by women. Be that as it may, red bunting is next to impossible to get, and the flagmen resorted to hand signals on the straightaways to combat this human perversity.

The Asphalt Plant

Hot-mix asphalt plants are not plentiful in Missouri. However, the Bridges Asphalt Paving Co. has a Hetherington & Berner hot-mix plant in good condition. It had seen service on eight other set-ups. This plant was brought in to Eldon and set up by the railroad on the east edge of town. All materials came in to this plant over the Rock Island lines. It was within 2.2 miles of one end of the project but almost 12 miles from the Bagnell end, plus a 0.75-mile dead haul.

Aggregate selected by the Missouri State Highway Department for the mineral filler consisted of coarse flint chat from the lead mines at Webb City, Mo., and of rolled flint sand. Additional fines in the form of limestone dust from Carthage, Mo., were also necessary. This material all came a distance of 200 miles by railroad from the southwestern corner of the state. Cars were unloaded and the material stockpiled near the hot-mix plant by a Northwest 1-yard clamshell.

Bitumen was furnished by MacMillan Petroleum Co. from El Dorado, Ark., and shipped in insulated tank cars. Since the time of delivery ran between four and twelve days, it was necessary to preheat all cars about 12 hours in order to get the liquid asphalt to flow. The penetration factor of bitumen was held between 100 and 120. Tests showed that most of the bitumen used ran about 116. The cars were heated by hooking their coils to the live steam line from a 125-hp Kewanee horizontal locomotive-type boiler.

After about 12 hours a Fairbanks-Morse pump delivered the asphalt to a 10,000-gallon steel storage tank. Another Fairbanks-Morse asphalt pump transferred the bitumen to the "brass brain" metering device at the pugmill, with by-pass and recirculating provisions available when asphalt was not being drawn out of the line.

The Kewanee boiler also kept about 105 pounds of steam circulating in the heating coils of the asphalt storage tank, and it furnished the steam for fuel atomization at its firebox. The operation of the drier trommel depended on an Allis-Chalmers industrial power unit, and a similar Allis-Chalmers engine drove the screens and hot-bucket elevator on the plant.

Aggregate was handled from stockpile to a 2-partition steel bin by the same Northwest crane which unloaded it from the cars. Aggregate passed from the bin to the single 54-inch drier, where it was heated to 260 degrees F. It then dropped on a scalper screen with $\frac{3}{4}$ -inch-square openings, passed through a 9/16-inch vibrating screen, and then to No. 4 and No. 8 screens. These four screens were set one on top of the other in a line, and they separated the material to three bin compartments for weighing. The weighing scales were Kron, with a dial indicator. A



C. & E. M. Photo

Bakers and helpers work behind this Barber-Greene bituminous finisher as it moves ahead at the rate of about 500 feet an hour.

Brown electric recording pyrometer indicated the temperature of aggregate. One of its thermocouples was located in the drier, and one was set in each hot bin. The hot-bucket elevator which

moved aggregate from the weighing hopper up to the pugmill was about 15 feet in height, and enclosed.

Batches weighing 2,500 pounds were dry-mixed 15 seconds before the brass

brain shot a charge of 6.2 per cent of hot asphalt by weight into the mix. The wet-mix time was 45 seconds. Mixing temperature during the humid mid-August weather settled down at about 260 degrees minimum, with 270 degrees F maximum. Capacity of the hot-mix plant was 425 tons in a 10-hour run, and the plant generally operated at about 80 per cent of capacity.

Four International dump trucks with 7-ton bodies were used on hauls under 3 miles. One truck per mile of haul was added when the hauls got longer than that, and the loads were then covered by tarpaulins to preserve the heat. Truck bodies were oiled every third load by the driver, who wiped them down with fuel oil from a 12,000-gallon storage tank near the Kewanee boiler. Each International truck hauled six batches.

The following volumetric proportions on asphalt and aggregate batches were set up by the Testing and Materials Division of the Highway Department:

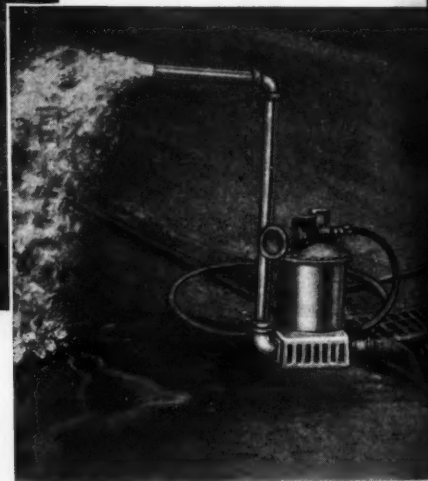
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CP EQUIPMENT... helps keep



↑ **FUEL-SAVING CP Two-Stage, Air-Cooled, Portable Compressors** produce 15% to 35% more air per gallon of fuel. The CP gradual speed regulator varies engine speed with air demand, resulting in reduced fuel consumption and less wear. Other refinements include pressure lubrication, Simplate valves, self-adjusting clutch. CP Portables are available in gasoline-powered models of 60, 105, 160, 210 and 315 c.f.m. and Diesel-powered sizes of 105, 160, 210, 315 and 500 c.f.m.

RUGGED, HIGH-LIFT CP-7 Portable Sludge Pump operates on the ejector principle. It handles up to 15% solids without excessive wear or frequent replacement of parts when water contains sand or other matter.



↑ **HANDY CP Backfill Tamper** quickly pay their way by saving the cost of handling surplus excavated materials, especially in trench work. Advantages include firmer and more uniform tamping, easy control of speed and impact — all available in four different CP models.



↑ **REMOVAL OR APPLICATION of nuts and bolts by CP 365-RP (impact type) Wrenches** is performed in a fraction of the time required by hand wrenches. Capacity of the 365-RP, $1\frac{1}{4}$ " bolt size. Five other models handle bolts, nuts, from $\frac{3}{8}$ " to $1\frac{3}{4}$ " bolt size.

LIGHT in weight, fast, and easy to handle. Chicago Pneumatic Clay Diggers are ideal for digging in clay, shale, etc. For general digging in soft to medium hard clay the lighter CP-3 is recommended. For digging in hard clay, shale, etc., there's nothing faster or better than the CP-5.



PRA Division Office To Serve Philippines

In accordance with the Philippine Rehabilitation Act of 1946, a new division office of the Public Roads Administration of the Federal Works Agency is to be established with headquarters in Manila. Its purpose, as defined in the Act, will be to "plan, design, restore, and build" such roads, essential streets, and bridges as may be necessary from the standpoint of national defense, economic rehabilitation, and development of the Philippines.

According to Thomas H. MacDonald, Commissioner of Public Roads, a preliminary planning mission has already made extensive studies. It has determined that a program to cost about \$100,000,000 will be necessary. Financing will include contributions by both the United States and the Philippines. For the 1947 fiscal year, \$9,960,000 has been allocated by the United States.

It is anticipated that the program will require four years for completion. Upon



C. & E. M. Photo

A Buffalo-Springfield reciprocating steam roller ironing almost up to the finisher as one lane is laid while traffic uses the other on the Eldon-Bagnell Dam road job.

its completion, the division office will be discontinued and its responsibilities will be transferred to the proper officials of the independent Philippine Republic.

The new office will be under the charge of Francis C. Turner as Division

Engineer, according to Mr. MacDonald's announcement. Previously, Mr. Turner had been assigned as consultant to U. S. Army forces and later to Canadian Army forces in maintenance of the Alaska Highway.

Plant-Mix Black-Top For Resurfacing Job

(Continued from preceding page)

Classification	Per Cent of Weight
Fine (No. 10 to 200)	33.8
Intermediate (No. 4 to 40)	30.0
Coarse (¾ to No. 40)	27.0
Mineral filler	3.0
Bitumen	6.2

The following tolerances were set up in the specifications for gradation of aggregate:

Sieve Size	Per Cent Passing
¾-inch	100
Pass ¾, retain on ¾	0-10
Pass ¾, retain on No. 4	22-35
Pass No. 4, retain on No. 10	25-40
Pass No. 10, retain on No. 40	15-30
Pass No. 40, retain on No. 200	6-24
Pass No. 200	2-8
Bituminous cement	6-8

Sieve analyses were run each day by Engineer-Inspector Harry Ebert, with density samples calculated by the headquarters testing laboratory in Jefferson City.

Placing the Hot-Mix

The resurfacing on U. S. 54 was laid in 11-foot strips 1 inch thick, compacted, at a temperature of 260 degrees. In order to get the final compacted thickness of 1 inch per course, it was necessary to set the screeds of the Barber-Greene finisher for a thickness of 1½ inches. The first mile of strip was carefully calibrated and balanced against volumetric content of truck bodies, and the distance each ton of material should reach was clearly established by J. H. "Jimmie" Glen, Project Engineer for the State Highway Department.

Except for a few places near the curb line, no priming was necessary. Where asphalt bleeding in the old pavement had not been excessive, RC-O was applied in a very light fogging spray at the rate of only 0.06 gallon per square yard.

The International dump trucks, rented by the hour from Southampton Transportation Co. of St. Louis, dumped directly to the receiving hopper of the Barber-Greene finisher. Unloading was done gradually while the truck was being pushed ahead by the finisher. The finisher worked to a center line of roadway established with a long length of binder twine. A finisher operator, a dump man, two helpers, and an asphalt raker comprised the placing crew.

The longitudinal center joint and construction joints at the end of a 10-hour day's run were left vertical, or square. Where the engineer believed it was necessary, this joint was painted with liquid asphalt to insure good bonding, and to eliminate a plane of weakness.

The Barber-Greene finisher, which will lay a level top even though washboard crests and troughs are quite uneven, performed excellently here. After the first course had been laid and rolled, it was possible to figure the next lift at 105 pounds per square yard, and hit it right on the nose.

Rolling of asphalt was done by two Buffalo-Springfield 10-ton two-wheel rollers, from 10 to 20 minutes behind the finisher. This time lag was increased in extremely hot weather. Rolling was done longitudinally, with at least 7 days required by the State before the second lift could be put down.

At the time the job was visited, the finisher was moving forward on an 11-foot strip at the rate of 500 feet per hour.

Labor Relations

In 1932 when the old pavement was laid, the contractor brought four negroes in to Eldon. Eldon did not want negroes. In 1932 the white people crowded around the four negroes all that first day. They stared silently. And they said, "Nigger, when the sun goes down don't you be here in this town!"

(Concluded on next page)

Jobs moving on schedule!

Contractors faced with a multitude of projects demanding early completion are quality-conscious buyers of equipment — especially pneumatic tools, air compressors, rock drills, sinker drills, etc. Today, as for more than 45 years —

CP equipment stands out for dependable performance and stands up against wear. If you want to know more about equipment that will keep your jobs moving on schedule, send for CP Catalog 600, "Construction Equipment."



↑ SPEEDING demolition work of all kinds, CP Demolition Tools operate with smooth efficiency and minimum kick-back. They are time and money savers for contractors. Sizes range from 25 to 77 lbs.

↑ ALL PURPOSE CP Rotary Grinder, equipped with detachable wire brush is ideal for fast surface cleaning on construction jobs. Light weight and true balance make handling easier for the operator.



↑ PACE-SETTING CP-42 Sinker Drill has penetrating power, excellent hole-cleaning, strong rotation. This fast 56-pound drill has a sturdy retainer spring encircling the front end, for longer life and lower maintenance. Ideal for general excavation, shaft sinking, quarrying, etc., CP makes sinker drills for every purpose, from the light 28-pound CP-22 Sinker, to the 119-pound, CP-60 heavy-duty spring handle model.

← the light weight G-200 R. Wagon Drill to provide one-man operation and faster drilling with the more powerful CP Drifter Drills. G-200 R is readily moved about, easily accommodates 6 foot steel changes; and handles up to 24-foot steels.



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ROCK DRILLS

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AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES



C. & E. M. Photo

At the hot-mix plant, Engineer-In-spector Harry Ebert runs a sieve analysis on rock aggregate during the Bridges Asphalt Paving Co. job.

Plant-Mix Black-Top For Resurfacing Job

(Continued from preceding page)

So well did they run their bluff that the colored men slept in the woods that night.

Today the situation is different. With the exception of Foreman Cleo Edmondson, Plant Foreman Adrian Bolling, and a few other key men, all labor on the project was hired locally. According to Superintendent Lowry, there is a plentiful supply of skilled and willing men in that community. Labor turnover and the staffing of his crews at capacity have not been nearly the problems that traffic control and the procurement of spare mechanical parts have been.

Personnel

This contract was administered under the direct supervision of Division Engineer V. B. Saville of Jefferson City, with G. L. Gray as Division Construction Engineer. J. J. Corbett is the Engineer of Construction for the Missouri State Highway Department, and Carl W. Brown is Chief Engineer.

Plan for Increasing Efficiency of Trucks

A system designed to enable users of motor trucks to increase their transportation efficiency has been developed by The White Motor Co. It is based on a study of major truck-using industries, over the past six years.

The system aims to control three primary factors in the efficient use of trucks: (1) correct application of the truck to the work it is to do, (2) improved maintenance designed for each vehicle, (3) better selection and training of drivers.

The plan was announced at a special preview held in Washington, D. C., for the heads of trade associations, and at the annual convention of the American Trucking Associations, in Chicago, Oct. 9, 1946. It was claimed that among the benefits provided by the system are lower cost per mile, greater dependability, longer truck life, lower maintenance cost, reduced accident rate, and lowered driver turnover.

In commenting on the plan, J. N. Bauman, Vice President of The White Motor Co., pointed out that the system is particularly timely now. Perhaps never again will so many truck owners be faced with the need to replace worn-out equipment, and be in a position to reappraise their transportation requirements before making purchases.

In working out the plan, which is termed the Continuing Control System of Truck Management, White has pre-

pared complete instructions and materials for putting it into effect. These are being made available through various industry sources. For further information, write to the company at 842 E. 79th St., Cleveland 1, Ohio.

Hose-Assembly Catalogs

How to get the most out of hose assemblies or hydraulic-control hose couplings is the theme of a catalog series issued by the Eastman Mfg. Co., Manitowoc, Wis. They also explain how to obtain the most economical assembly to fit any particular installation.

The Eastman bulletins cover, with cutaway views, text, and specification tables, all items in the line, and the care to be taken in the use of each. The hose are designed for low-pressure and high-pressure assemblies.

Copies of the bulletins may be obtained by writing to the company, and mentioning this notice in the January issue of CONTRACTORS AND ENGINEERS MONTHLY.



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HALF-BAG MIXERS
CONCRETE CARTS

PORTABLE FARM MIXERS
FLOOR HOPPERS

MORTAR BOXES

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THE MAKERS OF MARLOW PUMPS

build in
DEPENDABILITY
with
WAUKESHA ENGINES



• This construction job on a busy city street made it necessary for the contractor to by-pass sewage. The men are observing with satisfaction how easily the Model 421 Marlow Pump with its Waukesha FCU Power Unit is taking care of it.

MODEL FCU
4-cyl., 3 1/4" x 4",
133 cu. in. displ.,
gas or gasoline.

At partial or varying loads under which most engines work... this rugged four-cylinder power plant operating in the 20 to 30 hp. range... puts out more power with less fuel. At the same time it responds quickly, easily and smoothly to all power and load demands. For two reasons. Its Waukesha Blue Flame Manifold assures equal distribution of the fuel to all cylinders, and proper fuel mixture temperature for all load and speed conditions... while combustion is speeded up by its Waukesha Controlled Turbulence combustion chamber, making combustion complete, quiet and efficient. Send for Bulletin 1281.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

Subgrade Soils Are Mixed To Prevent Uneven Heaving

Materials in All Cuts on 3-Mile Grading Project Consolidated to Reduce Pavement Breaks

+ INCREASING emphasis is being placed by highway departments in northern states on stable subgrades, to prevent or reduce the damage which frost boils and heaving cause to highway surfaces. Where a rigid-type road surface is used, the frost boil itself, of course, does not appear on the highway wearing course. However, capillary action in an unstable or unconsolidated subgrade during the spring breakup when the frost goes out will cause uneven heaving of a concrete slab with resultant breaks and cracks.

The Michigan State Highway Department has taken definite steps to correct this condition. Illustrative of the work being done in this field is the subgrade treatment in all cuts along a 3-mile grading project on U.S. 2, just north of Ramsay in the Upper Peninsula. On this contract, started last fall, subgrade soils in all cuts are being thoroughly mixed so that when a concrete pavement is poured, there will not be uneven heaving to damage the slab.

The contract for this \$225,000 heavy-grading job was awarded early last fall by Charles M. Ziegler, Michigan State Highway Commissioner, to A. H. Proksch of Iron River. The 3-mile project is a succession of cuts and fills, running more than 100,000 cubic yards of excavation per mile. When completed, the existing narrow and winding trunk route through the town of Ramsay will be replaced with a straight, safe road by-passing the municipality.

Shovel Lays Mat

Work on the job started early in the fall when a Northwest 1-yard shovel worked over the location of the new grade, laying a 2-foot mat in the fill sections. Included on the job are a wide variety of soils running from sand and clay to muck and quicksand. The mat was laid in the low areas as a runway for the four Tournapulls with 12-yard scrapers which the contractor used to move much of the dirt.

The contractor pushed dirt-moving from the beginning to get as much yardage as possible before the early Upper Peninsula winter set in. The Northwest shovel was placed in one dirt cut loading six rented Ford, Chevrolet, and Dodge 3-yard trucks. On a 1,500-yard haul, the trucks carried about 1,000 yards from the shovel during a 9-hour shift.

Meanwhile, the Tournapulls and 12-yard scrapers had gone to work in another big dirt cut. At the time the job was visited by the CONTRACTORS AND ENGINEERS MONTHLY representative, only three Tournapulls were working with a fourth undergoing an overhaul. But the contractor had a fifth unit on the way to the job. His production schedule was set up for four Tournapulls with the fifth to be held in reserve for emergencies. Working in a 2,500-foot cut, 27 feet deep, and with an average haul of 2,000 feet, three Tournapulls and scrapers were averaging about 125 trips in 5 hours—or approximately 2,200 cubic yards of excavation during a 9-hour shift.

Cuts and fills over the job, with the exception of a swampy area, which will be discussed later, were balanced. Dirt from the cuts was dumped in the fill sections in 6-inch layers. There was

no compaction in cuts or fills beyond that obtained from the heavy, rubber-tired dirt-moving equipment.

Soil Consolidation

The Michigan State Highway Department was making a definite effort on this job to get away from differential frost heaving in the subgrade. The treatment given all cut areas was not designed to prevent heaving, but to get the subgrade to heave evenly.

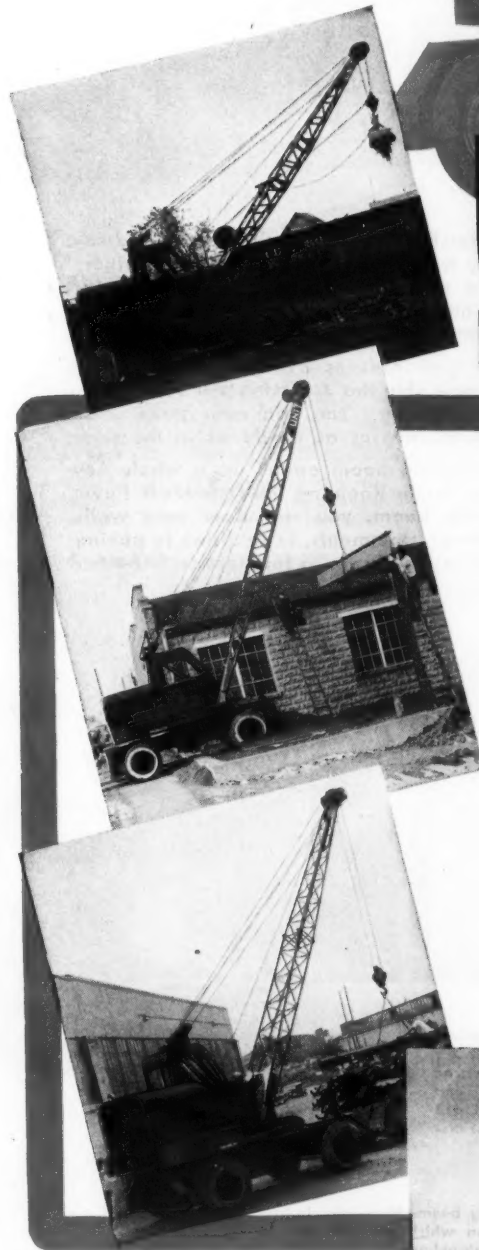
Through the cut sections over a roadway area 26 feet wide, subgrade soils were being thoroughly mixed. The Northwest shovel excavated down 2.75



C. & E. M. Photo

A scraper picks up a load on the Proksch heavy-grading contract in Michigan.

feet below the profile grade in the cuts for 13 feet out from the center line, and cast the material on the shoulder. The
(Concluded on next page)

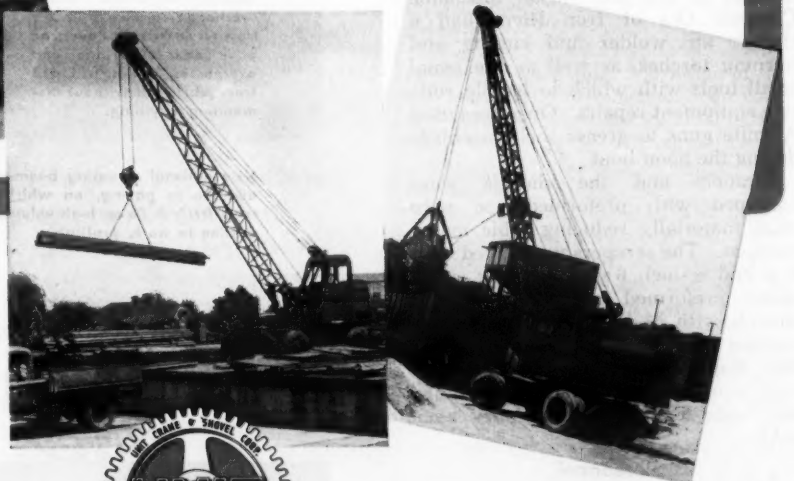


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Fast, versatile industrial crane with plenty of LIFT ability . . . ideal for moving castings, steel, scrap, coal, lumber or even machine tools. Travels anywhere . . . on paved surfaces, cinders or just plain mud . . . gets there in a hurry. Available with crane hook, clamshell, or magnet . . . quickly convertible to any other attachment. Operated by ONE man . . . powered by ONE engine . . . controlled from ONE position in cab. Features include: Hydraulic steering . . . Air-actuated hydraulic brakes . . . One piece cast gear case. FULL VISION CAB, pioneered by UNIT, provides 360° visibility for greater safety and efficiency.

5 Ton Capacity . . . 7 Tons with Outriggers



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Subgrade Soils

(Continued from preceding page)

soils were then replaced by a Caterpillar D8 and dozer, and the treatment repeated for 13 feet on the other side of the center line. This handling of soils mixed the various types in a consolidated subgrade.

All Set for Winter

While dirt-moving with the scrapers was pushed during fall days for maximum yardage before the freeze-up, the contractor had no intention of shutting down when the snow and ice came. This was one job that was ideally set up for winter operations. In one low area, there was 50,000 cubic yards of muck to be removed and replaced with mine-rock fill. Far from hampering operations, a good solid freeze would provide a mat for the Northwest 1-yard dragline which would remove the muck. The mine rock to be used for backfilling was dry material already stockpiled near-by, so there would be no difficulty in handling it. And the frozen ground would furnish a good haul road for the trucks.

About 1 per cent of the excavation involved on the job was rock, and most of this was concentrated in one cut where 18,000 yards was to be removed. This, again, was a good winter set-up, and the contractor planned to shoot the rock and run a shovel in the cut during the winter months.

The grade for the relocated highway section in typical profile showed a 51-foot flat earth grade with 2 to 1 back-slopes and 4 to 1 shoulder slopes. In addition to the Northwest shovel and trucks and the Tournapulls, other equipment on the grade included an International TD-9 with bulldozer leveling and spreading fill from the shovel; an Allis-Chalmers HD tractor and bulldozer handling fill from the scrapers; a Caterpillar No. 11 motor grader shaping and spreading; and a Caterpillar D8 and an Allis-Chalmers Model S "snatch" and "push" tractor.

Sand Cushion

Over a width of 48 feet across the flat earth grade, a sand cushion from 15 to 18 inches deep will be laid in 5-inch lifts; compaction of each layer will be obtained with the equipment on the road. The 50,000 cubic yards of sand required for this cushion will be removed from a borrow area about 2 miles from the middle of the job with a 1¼-yard Northwest shovel, and hauled in 30 Chevrolet, Ford, and Dodge 1½-yard trucks. The grade is designed for concrete pavement.

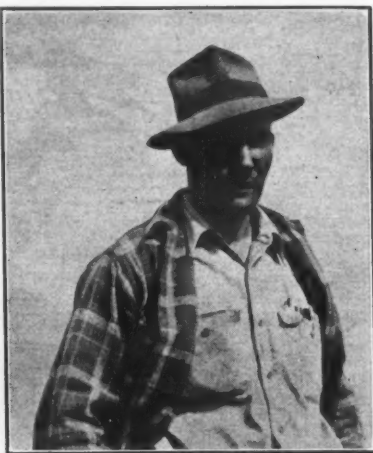
Equipment Maintenance

Although no special equipment was brought to this job, Master Mechanic Clarence Oss of Iron River had a Hobart arc welder and cutting and burning torches, as well as the usual small tools with which to handle routine equipment repairs. Operators used Alemite guns to grease their machines during the noon hour.

Scrapers and the shovels were equipped with preformed-type wire rope, materially reducing cable maintenance. The scrapers were fitted with 9/16 and ½-inch, 6 x 19 Lang-lay, steel-center preformed wire rope, and the shovels with ¾-inch preformed. According to Charles Proksch, Construction Superintendent, preformed wire rope is more flexible, easier to handle, and lasts longer than ordinary steel cable.

Personnel

The contractor employed 25 men working one 9-hour shift 6 days a week during the initial dirt-moving operations. The payroll was to be considerably increased as activities hit full



C. & E. M. Photo
Charles Proksch, son of A. H. Proksch, the contractor, was Construction Superintendent on the 3-mile dirt job on U. S. 2 in Michigan.

stride.

The work was in charge of Charles Proksch, Iron River, son of the con-

tractor, and Matt Tauntri, Wakefield, Project Engineer for the State.

Representatives Shifted, Dealers Named by FWD

The Four Wheel Drive Auto Co. has announced the appointment of new representatives in several states, the transfer of representatives between these states, and new dealers.

Lower Michigan and the state of Indiana will be under the supervision of Oscar Dolberg, who formerly covered Ohio and Kentucky. The Ohio-Kentucky territory will be supervised by Elmer Porter, former representative in Illinois. John Youngs, who formerly supervised the lower Michigan-Indiana territory, was transferred to upper Michigan.

Victor Anderson, assisted by Francis Thompson, will be in charge of the southern part of Illinois. Harry Ringdahl, former specialty salesman in Wisconsin, will handle the metropolitan Chicago area. The states of Missouri

and Kansas have been assigned to C. E. Dalum, formerly administrative assistant in the midwestern FWD zone office at Appleton.

The Southern Equipment Sales, Ltd., 980 So. State St., Jackson, Miss., has been appointed distributor for the southern part of that state. The central part of Illinois will be covered by the Illinois Road Equipment Co., 1310 E. Jefferson St., Springfield. Boyce-Curran Machinery Co., Inc., 2330 Florida Blvd., Baton Rouge, La., has received the distributorship for the southern part of that state.

Allied Steel Names Agent

The appointment of John G. Fitzpatrick of Indianapolis as direct factory agent has been announced by Allied Steel Products, Inc., of Cleveland, Ohio. He will serve the territory consisting of Ohio, Indiana, Illinois, and Michigan.

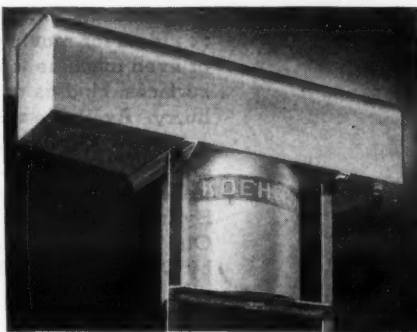
The company manufactures Bulldog Grip-Lug, Mango repointer bars, Excelloy hard-surfacing materials, etc.

RECENT IMPROVEMENTS KEEP KOEHRING *twinbatch* OUT IN FRONT

To maintain leadership, you just can't sit back and say: "This is so good, we don't have to improve it further." Since we brought out the Koehring 34-E *twinbatch* Paver, we have made many major improvements, two of them just recently.

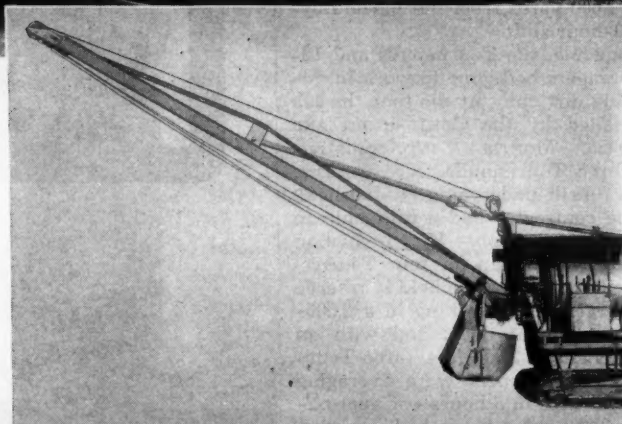
New low water tank reduces overhead clearance to 12'-2". You can now ship the *twinbatch* Paver without dismantling anything. You can now pave under low bridges and overpasses as easily as in the clear.

New optional elevating boom opens up a whole new field of application for the Koehring *twinbatch* Paver. With the elevating boom, you can now pour walls, foundations, footings, abutments, in addition to paving. Contact your Koehring dealer today for more *twinbatch* Paver information.



New low water tank reduces overhead clearance to 12'-2". Now *twinbatch* Paver can pave under low bridges and overpasses, can be shipped from job to job without dismantling anything.

New optional elevating boom. More jobs, in addition to paving, on which you can put *twinbatch* Paver high volume concrete production to work, profitably.



KOEHRING CO. MILWAUKEE 10 WISCONSIN



This hydraulically controlled bulldozer has recently been announced by the Jaques Power Saw Co.

Hydraulic Bulldozer

A hydraulically controlled bulldozer is announced by the Jaques Power Saw Co. The blade comes in various widths

to fit different jobs. It has a contour designed to move dirt or other materials quickly and uniformly. It is said to have a high lift for throwing and effective down pressure for digging. The cutting blade can be easily removed, the manufacturer says; blade angle can be changed to suit the job. Finger-tip hydraulic controls and full visibility are provided to insure ease and efficiency of operation, with minimum operator fatigue.

Complete details may be obtained from the manufacturer at P. O. Box 695, Highway 75, Denison, Texas. Please mention this news item when you write.

Marlow Builds Airport

Construction of the Marlow airport at Ridgewood, N. J., is expected to be finished in the near future. As soon as licensing arrangements and servicing facilities are completed, the port is to be made available for general use. It will also be used by Marlow Pumps for speedier contact with distributors and

customers.

The field is located in the southeastern section of Ridgewood. It is laid out with two grass runways, each approximately 2,000 feet long, and is planned to accommodate one and two-engine planes.

Caterpillar Staff Shifts

Appointment of M. A. Clements as Service Manager for the Western Division of Caterpillar Tractor Co. at San Leandro, Calif., was recently announced by the company. Mr. Clements has been with Caterpillar for several years as Service Engineer and, later, as Central Division Service Manager.

He succeeds R. E. Mayo, Western Division Service Manager since 1940, who has taken charge of the company's San Leandro field research office.

Mr. Clements' former position as Service Manager for the Central Division has been filled by J. D. Uhll, whose position as Service Engineer has been filled, in turn, by E. M. Iverson.

Cotton Fabric Tested In Bituminous Paving

PRA Tests Show Cotton Does Not Benefit as Edge Reinforcement Or Base-Waterproofing Membrane; Increases Construction Costs

THE Public Roads Administration, in cooperation with several state highway departments, has recently completed an interesting road-building experiment. It conducted tests to determine the usefulness of cotton fabric in low-cost bituminous road surfacing. The results of these tests have been compiled by Paul F. Critz, Senior Highway Engineer of the PRA, and were reported in *Public Roads*, Vol. 24, No. 10.

Earlier experiments with cotton fabric had been conducted in southern states between 1926 and 1935. They showed some promise but were inconclusive: no accurate records had been kept nor any attempts made at control. Next, some laboratory tests of cotton as reinforcement for thin bituminous surfaces were conducted by the PRA at the Arlington Experiment Farm in 1935. They included (1) physical tests of bituminous mixtures with and without fabric, and (2) a service test of fabric in a normal bituminous surface treatment of the type for which the fabric was believed to be most practical.

The physical tests showed that the fabric neither added tensile strength to the bituminous mixtures nor reduced their tendency to crack under load. The behavior of the mixtures under test was practically the same whether or not fabric was used.

The service test was conducted on an indoor circular track. Sections of the track surface were reinforced with fabric; then both reinforced and non-reinforced sections were subjected to simulated traffic. There seemed to be no significant difference between the sections, but these tests, too, were not considered conclusive.

Then in 1936, because a great surplus of cotton had accumulated, Congress authorized the Department of Agriculture to purchase large quantities of it and to promote its use. Opinions had been advanced that fabric in highway construction, cotton in particular, would reinforce the edges of thin bituminous surfaces, waterproof the road base, and reduce costs.

Accordingly, the Department of Agriculture prepared specifications for three types of cotton fabric believed suitable for an experimental program. It furnished the material without charge to state highway departments on condition (1) that they would use it to construct highways in an approved manner, and (2) that they would furnish service-behavior and maintenance-cost data.

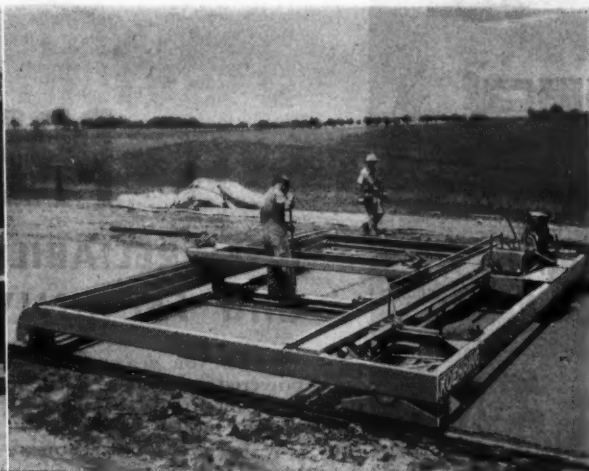
Two dozen states requested enough to surface more than 500 miles of 20-foot roadway. The fabric was furnished in widths ranging from 56 to 90 inches, each width in approximately equal quantities of the three weights and weaves.

Type A cotton weighed 5.30 ounces per square yard and had a thread count of 12 per inch in each direction. Type B weighed 4.25 ounces and had a thread count of 9 per inch. Type C weighed 3.20 ounces and had a thread count of 7 per inch. The average costs of these three types at the point of delivery were, respectively, 7.6 cents, 6.1 cents, and 4.6 cents per square yard. The average of the reported costs of handling on the job was 1.25 cents per square yard. The average cost of the fabric delivered and placed was 7.35 cents per square yard, or \$862 per mile of 20-foot road.

The 24 states built and reported on (Concluded on next page)



Grading costs less with Koehring excavating and hauling equipment. Koehring shovels come in a full range of sizes from 1/2-yard up. Koehring Dumper, built to work with shovels, dumps 6-yard load in 1 second.



Koehring Longitudinal Finisher finishes slab mechanically, exact to specifications. Keeps up with any paver pace. Always finishes at the RIGHT TIME. Cuts finishing costs to the bone.

PARSONS 250 TRENCHLINER

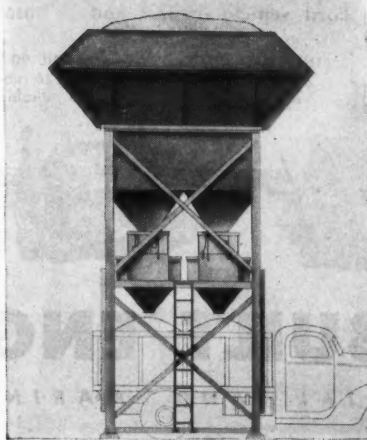


Straight, Clean Trenches for Sewers, Pipe, Water Mains

Parsons 250 Trenchliner, product of more than 40 years of trencher building experience, incorporates all the desirable features that make money for you on trenching jobs. Telescoping boom for easy depth adjustment. Shifts from side to side across full Trenchliner width. Centralized 1-man controls.

PARSONS CO.
NEWTON, IOWA

JOHNSON DUAL AGGREGATE PLANT



One-Stop Loading for Two-Batch Trucks Saves Trucks

With the Johnson Dual Aggregate Batching Plant, you spot batch trucks just once for a two-batch load. Both batches are discharged simultaneously. Extra spot stops are eliminated. On most jobs, number of hauling units needed to keep paver going, can be materially reduced.

C. S. JOHNSON CO.
CHAMPAIGN, ILLINOIS

KWIK-MIX DANDIE CONCRETE MIXER



Tilted Flow-Line Discharge Chute Empties Drum Seconds Faster

Tilted Flow-Line Discharge Chute, exclusive on the Kwik-Mix Dandie line of concrete mixers, reaches deeper into the drum, intercepts tumbling concrete at just the right angle to maintain natural flow-line in discharge. Kwik-Mix Dandie mixers are available in the following sizes: 3 1/2-S, 6-S, 11-S, 16-S.

KWIK-MIX CO.
PORT WASHINGTON, WIS.

Cotton Fabric Tested In Bituminous Paving

(Continued from preceding page)

141 experimental sections. These represented practically all types of low-cost bituminous construction and re-treatments, as well as widely diversified locales, soils, bases, aggregates, etc. The states reported on construction, condition at various intervals, and annual maintenance costs. The conclusions that follow are drawn from these reports and from the personal inspections made by Mr. Critz.

It should be noted, however, that some experimental sections were eliminated because of reconstruction, complete failure, or abandonment for relocation. Others lost their experimental value because of the practice in some states of re-treating all bituminous surfaces once or twice a year.

The tests showed that the benefits expected from the use of cotton fabric were not obtained. Conclusions were as follows:

(1) No benefit of fabric as an edge reinforcement was apparent. Edge failures are not as prevalent now as formerly and at present they are caused chiefly by unsatisfactory base conditions.

(2) The assumption that the fabric, when impregnated with asphalt or tar, would serve as a waterproof membrane to prevent surface moisture reaching the base did not prove correct. The fabric deteriorated even when surface and base failures did not occur.

(3) Failures from inadequate base support were as prevalent on sections containing fabric as on those in which fabric was not used. Therefore it cannot be said that cotton fabric would compensate for inadequate base support or permit the construction of cheaper bases.

(4) Under certain conditions, cotton fabric was beneficial when used on wooden bridge floors.

(5) The use of cotton fabric in the types of construction employed in these experiments results in a material increase in the cost of construction. Since it has little or no practical value, the increased cost is not warranted. When the cotton is used on bridge floors, the increased cost may or may not be warranted, depending upon the condition of the structure.

New International Body To Establish Standards

A new organization for establishing international standards has recently been formed, known as the International Organization for Standardization. It will consolidate into a single body the work of the old International Federation of National Standardizing Associations and that of the war-born United Nations Standards Coordinating Committee.

Policies have been established and officers elected by the delegates of 25

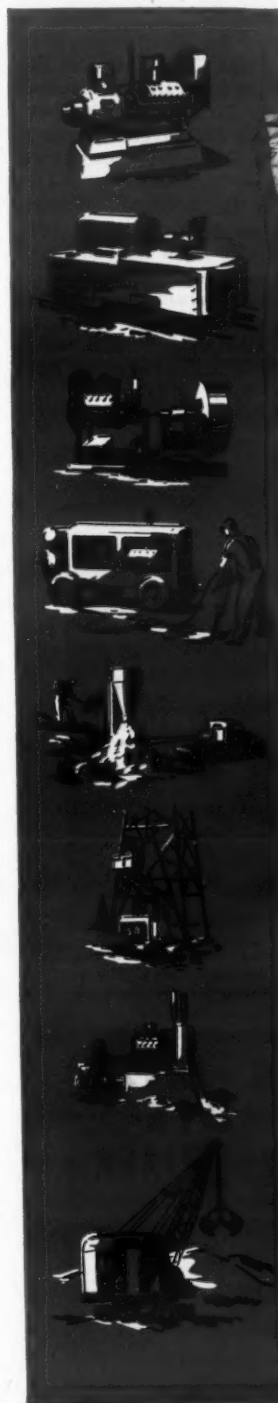
nations meeting in London. The President is Howard Coonley of the American Standards Association. Gustave L. Gerard, Belgium, is Vice President. Headquarters will be set up in Geneva, Switzerland, and three official languages will be used, English, French, and Russian.

Aid in Bucket Selection

A new catalog put out by Blaw-Knox is designed to make it easy for prospective bucket users to make their selection. Combined pictures and tables enable a bucket user to coordinate his crane capacities with the data presented

in selecting the right bucket for re-handling, hard digging, or dredging.

A copy of this 46-page catalog will be sent free, upon request to Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa. Ask for catalog No. 2076, as described in CONTRACTORS AND ENGINEERS MONTHLY.



PREFERRED!

—for RELIABILITY . . . for ECONOMY . . . and for UNIVERSAL FORD SERVICE!

Whether you design and build engine-powered industrial equipment, sell it, or use it, here is a fact so vital that it deserves your most earnest attention:

Nearly all such machinery—whether pumps, electric generating plants, compressors, power units, saw rigs, ventilating and spraying units, or other portable equipment—by its very nature, will spend its service life on jobs where it's "on its own"—where reliability and ready maintenance service are all-important—and where the transportation of motor fuel makes gasoline economy a constant concern.

FORD-BUILT ENGINES PROVIDE UNIQUE ADVANTAGES IN SUCH SERVICE. Ford engine reliability is known and respected the world over. Millions of Ford vehicle owners and

automotive mechanics are thoroughly familiar with Ford engines. Ford economy is famous. And Authorized Ford Service is available in every community of any importance.

Certainly, then, if your power requirements come within the range of 40 to 100 horsepower, you could not choose an engine which would offer you as many positive advantages as Ford.

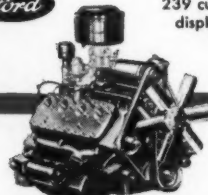
Three Ford-built engines are now available, as shown below. You can buy them singly or in quantity, through any Ford Dealer or from Ford Motor Company. For detailed specifications and dimensional data, write—

FORD MOTOR COMPANY

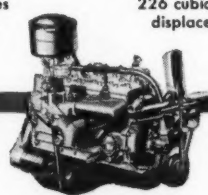
Industrial and Marine Engine Department
3507 SCHAEFER ROAD, DEARBORN, MICHIGAN



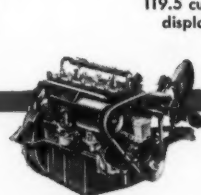
THE 100-H.P. V-8
239 cubic inches displacement



THE 90-H.P. SIX
226 cubic inches displacement



THE 40-H.P. FOUR
119.5 cubic inches displacement



FORD-BUILT ENGINES

FOR INDUSTRIAL AND MARINE POWER

ALL WELDED STREAMLINED

McCAFFREY BUCKETS

For Fast Digging and Material Handling



For Fast Digging Type D Clamshell
The Type D Clam Shell Bucket digs deeper, faster and lasts longer. Weighted and balanced to insure maximum pickup load.



A radical departure in design, the Single Line Bucket recommended for overhead cranes, speeds up moving of loose materials, all welded.



Every McCaffrey Clam Shell Bucket is streamlined all welded. No bolts or rivets to slow up digging, dumping or material handling. Hi-carbon steel lips, teeth and pins. Sizes from 1/2 to 3-cubic yard capacity.

Increased Drag-line Performance.
● Perfectly balanced for fast digging.
● All welded, no bolts or rivets to slow up digging.
● Faster, dumps quicker and cleaner.
● Hi-carbon steel lips and teeth.
● Replaceable points on teeth.
● Available in 6 sizes, from 1/4 to 3 yard.

Rugged—Lightweight Construction Equipment.

M. P. McCAFFREY, INC.

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Keep On

BUYING BONDS

★ ★ ★ ★

DON'T SKIMP!

Highway Rebuilt; Safety Increased

**Sight Distance Increased
On Wider Macadam Road
Built With Stone Base on
Gravel Foundation Course**

THE existing macadam pavement along a ½-mile section of State Route 3 near Hanover in eastern Massachusetts was in good condition, due to careful maintenance. But its vertical alignment was a hazard to safe driving. This factor weighed heavily in the decision of the Massachusetts Department of Public Works to reconstruct a 2,700-foot stretch of this Boston-Plymouth highway, known locally as Columbia Road.

Where this road intersects Broadway, an east-west artery through Hanover, a sharp rise over a hill reduced sight distance to less than 600 feet. This made it difficult for motorists to respond to the traffic light placed at the side of the intersection. Moreover, at this point the existing roadway was only 30 feet wide. It was built with a 7-inch bituminous-macadam pavement 20 feet wide on a 12-inch gravel sub-base, flanked by shoulders averaging 5 feet in width.

This road has been reconstructed in the same location but to a 46-foot roadway section designed on a flatter grade to increase the sight distance. A. R. Simeone, Inc., a Medford, Mass., contractor, was awarded the job on his low bid of \$40,000. He experienced delays in purchasing both equipment and materials, and faced the necessity of maintaining traffic on this heavily traveled route to Cape Cod. However, the contract got under way in May, 1946, and was finished by the end of August. The new highway also has a 12-inch gravel sub-base for a foundation course on which the bituminous-macadam pavement was laid.

Grading

The heaviest grading was at the north end of the project around the Broadway intersection. There a 6-foot cut 900 feet long was removed, thus eliminating the hill responsible for the short sight distance. Half the width was done at a time so that traffic could pass with the least inconvenience. A Lorain 79 ½-yard shovel excavated the sandy-clay soil along with the old pavement and loaded the material to four Sterling 6-yard trucks hired by the hour. About 90 per cent of the earth work on the job was waste, since the cross sections called for cuts along most of the improvement. But the contractor was able to dispose of the dirt without difficulty to various landowners adjacent to the road. Cut slopes were trimmed 2 to 1 while the fill slopes are 4 to 1.

A Caterpillar D7 tractor-dozers shaped the roadbed after the excavation. In the



C. & E. M. Photo

A Caterpillar No. 12 power grader and a Buffalo-Springfield 18 to 20-ton tandem roller prepare the subgrade for a Jaeger spreader to lay stone base course on the Simeone contract for road reconstruction near Hanover, Mass.

meantime the shovel was moved to a gravel pit about ½-mile average haul distance from the job. The same trucks used in the earth moving hauled the gravel, which was laid in two 6-inch compacted courses. It was spread by

the dozer and a Caterpillar No. 12 power grader, and then rolled by a Buffalo-Springfield 18 to 20-ton tandem roller. To get the gravel, the shovel stripped the pit area of from 8 to 12 inches of loam, which was also hauled

back to the road and dumped along the toe of the slopes. From here the tractor-dozers spread it over the slopes to a depth of 6 inches in preparation for the seeding.

When the gravel sub-base was completed, granite curbing was set at the edges of the roadway through the cut sections, after some old concrete curbing had first been removed. The new granite curb is 5 inches wide, 17 inches deep, and was delivered in 4 to 5-foot lengths by the H. E. Fletcher Co. of West Chelmsford, Mass. The gravel met the following gradation requirements:

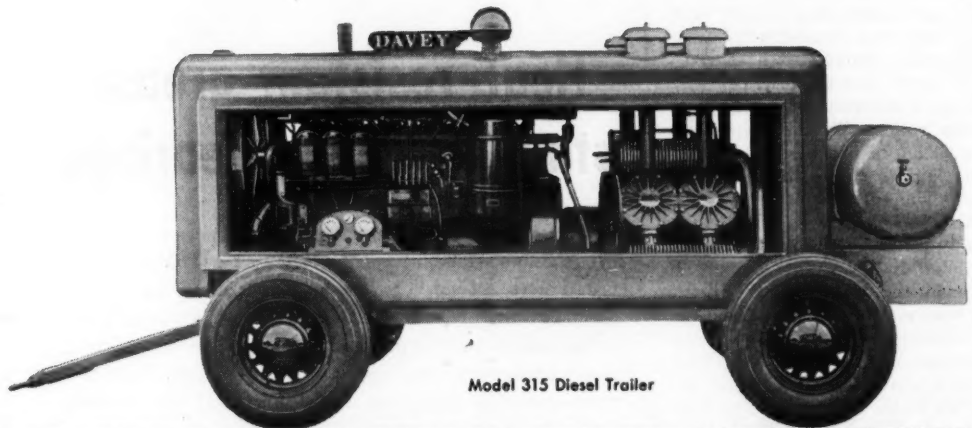
Sieve Size	Per Cent Passing
2 ¼-inch	100
1 ½-inch	70
No. 4	50
No. 200	5

Stone Base, Macadam Top

On top of the gravel, which extended across the full roadway section, a base course of crushed stone bound with sand was laid to a compacted depth of 4 ½ inches. The stone was purchased

(Concluded on next page)

there's a DAVEY FOR EVERY COMPRESSED AIR NEED



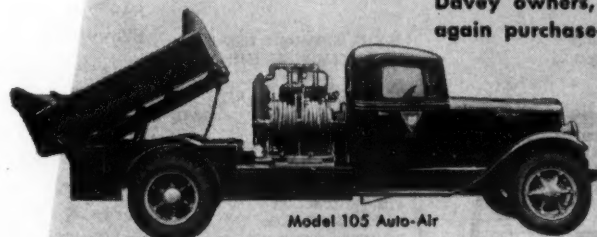
Model 315 Diesel Trailer

Davey Compressors are built for just one class of buyers—those who demand the best!

They're consistently preferred by users who keep careful records of initial cost, operating and maintenance expense . . .

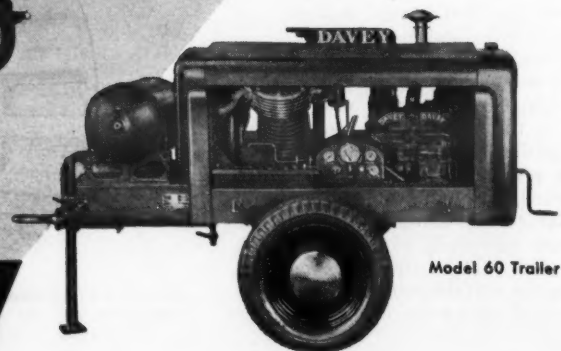
Proof of this preference is found in the five years prior to the war when 97 per cent of the Davey owners, who bought new compressors, again purchased Daveys.

P & P-111



Model 105 Auto-Air

In addition to a complete line of trailer and Auto-Air units (60 to 315 c.f.m. capacities), Davey builds • Mobile Machine Shops • Track-Air Compressors • Departmental (Industrial) Units • Truck Power Take-offs • Mine and Railway Compressors • Power Saws • Portable Lighting Equipment.



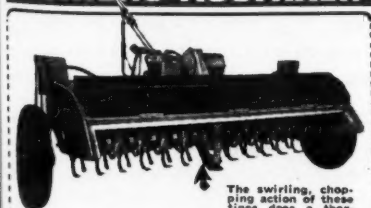
Model 60 Trailer

DAVEY

There are Davey Dealers in Principal Cities

DAVEY COMPRESSOR CO.
KENT, OHIO

FOR SECONDARY ROAD CONSTRUCTION ... ARIENS AGGMIXER



The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and serves aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate—adjustable to any tractor—made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY BRILLION WISCONSIN



C. & E. M. Photo

On the road-reconstruction contract near Hanover, Mass., this Jaeger 10-foot spreader lays stone base course. The box has just been filled from a Sterling truck.

Road Rebuilt

(Continued from preceding page)

from Bradford Weston Co. of Hingham, Mass., 12 miles away, and transported to the job in from 5 to 10 trucks hired on a yardage-haul basis. The trucks were chiefly Sterlings and Macks carrying 10 to 12 tons a load. They end-dumped the stone into a Jaeger adjustable spreader which was towed along by the truck as it laid the base stone in a 10-foot lane.

Half the road was covered with stone, which was then choked with sand by working it down into the crevices with hand brooming followed by rolling with the tandem roller. With the spreader box, an average of 300 tons of crushed stone was laid to grade in an 8-hour day. Traffic was not permitted over the half width of base-course stone while the remaining half of the road was being completed in the same manner. It was not permitted, in fact, until half the road had been completed and sealed.

Next, another layer of stone, known as the top course, was spread in similar fashion to a compacted depth of 2½ inches. This stone was not bound with sand as was the base course. The gradation of the two courses of stone varied slightly as follows:

Sieve Size	Per Cent Passing	
	Base	Surface
2½-inch	100	100
2¼-inch	95-100	95-100
2-inch	...	70-95
1½-inch	...	20-50
1¼-inch	0-50	0-15
1-inch	0-15	0-5
¾-inch	0-15	...
½-inch	0-5	...

The surface course was then given a penetration coat of 85 to 100-penetration asphalt. It was applied at the rate of 1½ gallons to the square yard by the Trimount Bituminous Products Co. of Everett, Mass., its distributor making a 20-mile haul to the job. This surface course was then choked with stone so that all the interstices were well filled. Afterwards a double seal coat was applied to the top stone.

The seal consisted of ¾ gallon of asphalt emulsion to the square yard, applied in two sprayings of ½ and ¾ gallon to the square yard respectively. Each application was followed at once with a pea-stone cover course which was rolled thoroughly so as to fill in all the voids. The rolling also shaped the pavement surface to a crown of ¼ inch to the foot. The two stones used in choking the surface course and filling in the voids of the seal coat were graded as follows:

Sieve Size	Per Cent Passing	
	Choke Stone	Pea-stone
¾-inch	100	...
¾-inch	95-100	100
¾-inch	30-70	95-100
¾-inch	...	30-70
No. 4	0-5	0-35
No. 8	...	0-5

Originally the intention was to fertilize the loam on the slopes with a fertilizer having the proportions of 10-6-4 of nitrogen, available phosphoric acid, and water-soluble potash. But with nitrogen very difficult to obtain, a 6-10-4 mix was used instead. The slopes were seeded with the following grass formula:

Sheep fescue	30 per cent
Canada blue	20 " "
Rye grass	20 " "
Redtop	15 " "
White clover	15 " "

Quantities and Personnel

The major items of the contract included:

Excavation	16,500 cu. yds.
Granite curb	4,345 lin. ft.
Gravel sub-base	4,100 cu. yds.
Crushed stone	3,750 tons
Bitumen	30,000 gals.
Loam borrow	1,850 cu. yds.
Seeding	9,300 sq. yds.

A. R. Simeone, Inc., employed a force averaging 20 men, not including truck drivers, under the supervision of A. Simeone, Superintendent. L. Chenard, Resident Engineer, was in charge of

the project for the Massachusetts Department of Public Works, which is headed by Joseph F. Cairnes as Commissioner, with P. H. Kitfield as Chief Engineer. Francis T. McAvoy is Construction Engineer for the Department. The job was located in District 7 of which Lewis R. Sellev is District Engineer with headquarters at Middleboro.

Own a share in America, and make your own future secure, by buying U. S. Savings Bonds regularly.

Porter-Cable President

DeAlton J. Ridings has been elected President of the Porter-Cable Machine Co., Syracuse, N. Y., succeeding his father, Walter A. Ridings, who died October 17. The new President has been with the firm for a number of years, and has been General Manager since 1941. Porter-Cable's chief products are portable tools, grinding machinery, and similar equipment for the contracting industry.

Hobart arc welding is faster!

HOBART "One of the World's Largest Builders of Arc Welders."

Exclusive REMOTE CONTROL does it.

Take Hobart's handy Remote Control Dial with you when you're working far away from the Arc Welder—you'll get the right heat for superior quality welds and save valuable time by eliminating return trips to the machine. An equally important feature is the Multi-Range Control that offers you 1000 volt-amp combinations without a single "dead spot." If you're welding for profit—Hobart is the logical choice. Write for details. Hobart Bros. Co., Box CE-17, Troy, O.

STANDARD ENGINEERS NOTEBOOK

Heat-resistant grease stays in wheel bearings

RPM Wheel Bearing Grease is specially made for all types of wheel bearings. Because it withstands extreme heat, it won't melt and throw out even in hard service. This prevents lubricant from working onto brake shoes and keeps bearings from becoming dry. Where necessary, extra grease can be packed in hubs, thus assuring adequate lubrication at all times.

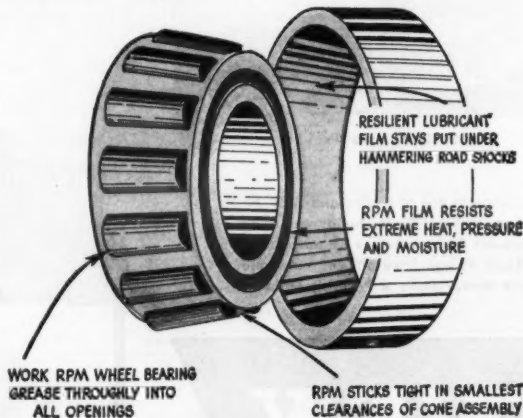
The tough, resilient film which RPM Wheel Bearing Grease spreads over bearings, won't break down under extreme pressure or jolts and shocks. It resists water and seals out dust and dirt.

Truck and bus manufacturers recommend using extra care in lubricating, cleaning, and adjusting wheel bearings.

Handy guides that assure this are the free Standard booklets, "How to Service Wheel Bearings." There's one for light equipment and one for heavy equipment. Send for your copies.

CLEAN WHEEL BEARINGS CAREFULLY BEFORE LUBRICATING

IF PART IS DAMAGED REPLACE ENTIRE BEARING ASSEMBLY



DETERGENT KEEPS RING GROOVES FREE OF STICKY, CLOGGING DEPOSITS

RPM HEAVY DUTY PROVIDES SEAL THAT STOPS BLOWBY OF COMBUSTION GASES

MAINTAINS RING TENSION

PREVENTS HIGH CYLINDER WEAR, EXCESSIVE DILUTION AND OXIDATION OF CRANKCASE OIL BY UNBURNED FUEL AND GASES

OIL FILM STICKS ON PISTON AND CYLINDER THROUGHOUT ENTIRE TEMPERATURE RANGE

Heavy-duty motor oil reduces cylinder wear

Many fleet operators have eliminated stuck rings, blow-by and excessive cylinder wear by using RPM Heavy Duty Motor Oil.

This special heavy duty oil contains patented additives which remove sticky gum, carbon and lacquer from rings and ring grooves, keeping rings free so they can expand fully. With rings expanded, the tough lubricant film of RPM Heavy Duty Motor Oil forms a seal between rings and cylinder which prevents the force of combustion from driving gases and fuels down the walls.

RPM Heavy Duty Motor Oil sticks to metal at all operating temperatures. This assures unsurpassed lubrication at all times on surfaces of cylinders, pistons and rings, reducing wear to a minimum.

RPM Heavy Duty Motor Oil will resist sludge formation even in coldest operations, will not foam or corrode bearing metals.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Col.; Standard Oil Company of Texas, El Paso, Texas.

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PRODUCT



This new CMC 3-M centrifugal pump features lighter weight, a double-shaft seal, and dual-prime construction.

Light Weight, Special Seal Features of Pump

A redesigned lightweight pump has been announced by the Construction Machinery Co., 1939 Loveall St., Waterloo, Iowa, to supplement its line. The pump is a new version of the 3-M dual-prime CMC centrifugal pump. A large reduction in weight has been brought about, the manufacturer explains, by the removal of unnecessary waste metal and unduly heavy wall sections; yet pump case and suction head remain interchangeable.

The 3-M has, as standard equipment, the same type of seal as is used on the larger CMC pumps. This is a double-shaft seal with flexible Neoprene diaphragms, hardened ball-bearing steel rotating seal surfaces, and stationary bronze seal plates.

Other features claimed for it are large pump case and dual-prime construction, trash-type impeller and streamlined case, and high-suction inlet. Further information on this and other pumps in the CMC line may be obtained by writing to the manufacturer.

Trigger-Action Vise

A new quick-action heavy-duty vise is announced by Grand Specialties Co., Grand Ave. at Troy St., Chicago 22, Ill.

Known as the Grand Vise Master, this general-utility speed vise is said to close instantly with a push on the free jaw, and to open automatically by trigger release on its spring action. These are features previously limited to the smaller Quikcet Vise manufactured by the same company.

In addition, the vise is equipped with Double Bite steel-pipe jaws which are integral with the body. The Double Bite consists of double pipe jaws in back to prevent "whipping".

The vise revolves a full 360 degrees on its base with a double-swivel friction-type lock-up which fastens from both sides and holds the desired swivel position. The free jaw moves on a specially designed triangular sliding member; its 40-degree angle offers easy approach to the vise from the bottom and acts to disperse filings, fragments, welding spatter, etc. This sliding member is fully enclosed and protected when the vise is in closed position.

In action, the vise is closed with a push on the body of the free jaw which slides swiftly in and can be tightened with a slight turn of the loose-proof handle. The special spring and screw action is claimed to eliminate the so-called slack in the main tightening screw and to provide a balanced precision grip. The vise automatically opens to its full 4 1/2 inches when the operator pulls on the trigger after easing tension by a slight turn of the handle.

The vise is made of alloy steel. Weight is given as about 23 3/4 pounds. Length with jaw open is 17 1/2 inches, closed 13 inches. Width is 7 1/2 inches; height is 7 1/4 inches; and width of jaws is 3 1/2 inches. Further details and prices can be obtained from the company on mention of this item.

Medium-Size Grader Has Tandem or Single Drive

With resumed production of the Caterpillar diesel No. 212 motor grader, the smallest of three sizes of Series 12, the manufacturer has issued a new folder outlining the construction attributes and operational advantages of this machine.

The illustrated folder includes basic specification figures. It outlines the tandem or single-drive features of the product, the leaning front wheels, the wide variety of positions possible with the standard 10-foot blade, and the extreme positions possible by adjustment,

whether for cutting ditches or high banks. It also lists the attachments available to users, such as a V-type scarifier, blade extensions, electric starter, etc.

Copies of the folder may be obtained by writing Caterpillar Tractor Co., Peoria 8, Ill., and requesting Form 9730.

N. J. Shifts Highway Staff

Several changes have been announced in the engineering personnel of the New Jersey State Highway Department. C. F. Bedwell has assumed the post of Chief of Design and Construction and will serve as coordinator

of the engineering functions of the entire Department. His deputy will be C. A. Burn, formerly Northern Construction Division Engineer.

Harry D. Robbins will succeed Mr. Bedwell as Construction Engineer. Neil MacDougall, Assistant Engineer of Plans and Surveys at the Newark office, will be Central Division Construction Engineer.

Governor Driscoll has declared highway development an important order of business. The present proposed budget is the largest ever submitted, says State Highway Commissioner Spencer Miller, Jr., and calls for an increased investment of capital funds.

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EXCLUSIVE FEATURES
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The OWEN BUCKET Co.

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Branches: New York, Chicago, Philadelphia, Berkeley, Calif.

BUCKET



This steam vapor cleaner, manufactured by Tivit Products, is oil or gas-powered. It comes in three series pumping 160, 260, and 900 gph respectively.

Steam Vapor Cleaner

Simplicity, durability, and efficiency are three of the features claimed for the Tivit steam vapor cleaner. It is heated by either oil or gas and comes in three series, pumping 160 gph, 260 gph and 900 gph. The last named operates with two steam guns and one high-pressure cold-water gun simultaneously. Caster or trailer mountings are available.

Some of its features are the Hy-Vel nozzle, a Tivit 4-step venturi type designed to increase steam velocity 5 feet per second; a reciprocating low-speed pump designed for long service; and a special heating coil of steel tubing said to give maximum heat transfer from the burner. The concentrate tank is readily accessible. It holds enough concentrate for 8 hours of normal operation.

Complete specifications and a manual and parts list can be obtained from the Tivit Products Co., Division of Kelite Products, Inc., P. O. Box 2917, Terminal Annex Station, Los Angeles 54, Calif. Ask for bulletins on the 320 or 600 Series, and mention this notice.

Clipper Changes Location

The Clipper Mfg. Co. has moved its offices to a newly completed building at 2800 Warwick, Kansas City 8, Mo. The St. Louis warehouse at 4030 Manchester will still be used as a shipping point for that region.

The new factory and general office building allows for increased manufacturing facilities of the Clipper line of hoists, blades, masonry saws, etc., and a testing laboratory.

Engineering Posts

In Federal Service

The U. S. Civil Service Commission is accepting applications to fill responsible engineering positions in the Federal service in Washington, D. C. The majority of the positions are in the War Department, Navy Department, Department of the Interior, Department of Commerce, Department of Agriculture, and Federal Works Agency. The salaries are \$7,102 to \$9,975 a year.

To qualify for these positions, applicants must meet one of the following basic requirements: (1) completion of a standard professional engineering curriculum leading to a bachelor's degree; (2) four years of progressive technical engineering experience; or (3) any combination of (1) and (2). In addition, they must have had four years of broad and progressive professional engineering experience. Appropriate graduate study may be substituted for part of this experience.

A written test is not required for this

examination; applicants will be rated on their experience and training as described in their applications. The maximum age limit, 62 years, is waived for persons entitled to veteran preference.

Applications will be accepted in the U. S. Civil Service Commission, Washington 25, D. C., until further notice. Additional information and application forms may be secured at most first and second-class post offices, from the Commission's regional offices, or from the Commission's office in Washington.

Jacobs Goes to Blackmer

The appointment of Arthur E. Jacobs to the position of Vice President and Sales Manager has been announced by the Blackmer Pump Co., Grand Rapids, Mich. Mr. Jacobs was formerly General Sales Manager of the Pump Division of George D. Roper Corp., Rockford, Ill., and he is now serving as Chairman of the Rotary Pump Section of the Hydraulic Institute.



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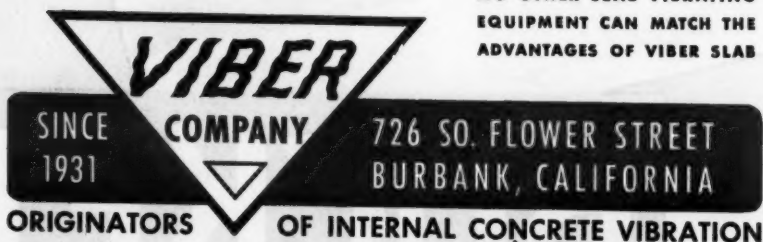
Air-Cooled Power



VIBER SLAB

The Viber Slab is a multiple-unit, full-depth vibrating attachment for finishers or spreaders. It permits the continuous and uniform consolidation of heavy-duty concrete highways and airport runways. The number of vibrating units used is determined by the width of the strip to be consolidated and each unit is spaced for maximum, synchronized effectiveness over the entire area. The specially designed Viber vibrators maintain the unequalled high speed of 9,500 r.p.m., in concrete, which not only assures consistently fine quality of workmanship, as proven by test borings, but results in substantial savings in construction time and maintenance costs. Even the stiffest mixes of super-thick slabs can be economically vibrated full-depth and uniform density obtained throughout. Quotation on request.

NO OTHER SLAB VIBRATING
EQUIPMENT CAN MATCH THE
ADVANTAGES OF VIBER SLAB



Expressway Crossed By New Steel Bridge

Contract Includes Exit Ramps and Approaches for Speeding Traffic Through Large Eastern City

WHEN the Park River flood-control conduit was constructed through the center of Hartford, Conn., several years ago, it necessitated the reconstruction of several of the city's old landmarks. Among them was the Prospect Street Bridge, which formerly spanned Park River as it flowed in an open channel on its way to meet the Connecticut River. Last summer a new overpass was completed. It carries Prospect Street, one block east of Main Street, over the new express highway which has been constructed on top of the big double-barrel conduit through which Park River now flows. In addition to the new structure and approaches, the improvement includes exit ramps from the Park River expressway at Sheldon and Front Streets. It also includes concrete steps and sidewalks at the northwest abutment of Charter Oak Bridge, which crosses the Connecticut near where Park River empties into it.

The job was done by the Charter Oak Construction Co. of Hartford under a \$110,087 contract with the Connecticut State Highway Department. Work on the project began the latter part of April, 1946. The bridge was ready for traffic by the end of August, despite serious shortages in materials ranging all the way from nails to structural steel. The exit ramps and approaches to the Park River conduit, part of the Charter Oak Bridge express-highway system, will ease the flow of traffic in and out of the congested downtown business district of Hartford, busy capital city of Connecticut.

Because of the war, the building of the Prospect Street Bridge could not proceed normally. The need for a span was evident, but the designed steel for the deck could not be obtained. So the Highway Department was forced to plan a temporary bridge across the depressed highway. It utilized three girders salvaged from an abandoned railroad bridge and stretched them across the 82-foot span. Then a 3-inch plank floor was laid as a deck for the two-lane bridge, which served its purpose well for the duration.

New Bridge

The first step in the new project was the removal of the old girders. This was done by Leake & Nelson Co. of Bridgeport under a subcontract. After that the back wing walls of the abutments, which had been poured to fit temporary deck plans, were cut down with jackhammers, and the main walls were altered in order to seat the new steel properly.

Because of the great difficulty in obtaining structural steel for the bridge, the State undertook to get the material, so this item was omitted from the contract; the contract did, however, contain an erection item. The American Bridge Co. furnished and fabricated the steel. It shipped it from its plant at Elmira, N. Y., to the New Haven Railroad freight yard in Hartford where it was unloaded and trucked to the job site. Two cranes with 60-foot booms handled the erection; it was completed during the first half of June.

The superstructure consists of four structural-steel girders measuring 82 feet, center to center of bearings. The two outside or sidewalk girders are 5 feet back to back of angles. The two main girders are 7 feet back to back of angles, and are located 6 feet 5 inches from the center line of the outside

members. Between each pair of girders is a sidewalk which forms the top of an enclosed duct for electric, water, and gas lines. The structural steel inside the ducts is coated for protection against corrosion by a 1½-inch layer of reinforced shotcrete. The 40-foot roadway extends between the inside girders. Cross bracing consists of four 30-inch I-beams starting at 16 feet 6 inches from each end, with a central spacing of 16 feet 4 inches on centers. Running lengthwise of the bridge under the roadway are seven 18-inch I-beams on 6-foot 6-inch centers framing into the cross bracing.

Supported by the steel is a 7¼-inch reinforced-concrete slab with a 3-inch cross slope from the center of the 40-

(Concluded on next page)

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—with a fleet of Wooldridge Terra-Cobras



WOOLDRIDGE "TERRA-CLIPPER" Scrapers embody the same Bowl features as the "Terra-Cobra"

Lifting thousands of yards of sandy soil from the toe to the crest of this earth-fill dam at Fort Peck, Montana, is another job calling for the high speed, high production performance of Wooldridge Terra-Cobras. Positive traction, power, speed and two-wheel steering control result in fast loading, haul, spreading and return travel. Full capacity yardages moved per unit insure uniformly high averages throughout each shift. Extreme ease of handling the Terra-Cobra—fully loaded or empty—over all types of ground surfaces—permits operator to avoid fatigue slow-downs. To speed-up earth-work schedules, investigate Wooldridge Terra-Cobras—today. Write for full details.

Measure Each Job in terms of WOOLDRIDGE EQUIPMENT:

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NATIONWIDE SERVICE

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TERRA COBRA

HIGH SPEED-SELF PROPELLED
EARTHMOVERS

New Steel Bridge

(Continued from preceding page)

foot roadway. The roadway is flanked on each side by a concrete curb and the sidewalk, which is separated from the roadway by the high inside girder. A 2½-foot-high steel railing is mounted on top of the outer girders.

Concrete Retaining Walls

Only a limited area was available in which the exit ramps for Front Street could be constructed leading from the expressway, so the fill is confined behind concrete retaining walls. These walls vary in length from 200 to 400 feet, with a maximum height of 17 feet. They are from 12 to 22 inches thick, depending on the height as the walls rise from the depressed expressway to street level. Wall forms were made of 1 x 6 lumber for the most part, backed by 2 x 6 studs set on 16-inch centers, with double 2 x 6 wales spaced on about 3-foot centers.

Dry batches of sand, stone, and cement were purchased from the Edward Balf Co. of Hartford whose plant is ½ mile from the job site. For transporting the material the contractor used two of his own Mack trucks each holding three 1-yard batches. Mixing was done in a Ransome 27-E paver, and the concrete was chuted directly into the forms from the top of the side bank. It was vibrated with a Mall vibrator as it was deposited. Water for the concrete was obtained from fire hydrants. The access roads were also paved with concrete up to 26 feet in width.

For the steps and sidewalk work near the Charter Oak Bridge, which is 1½ miles east of the Prospect Street location, truck-mixed concrete was used. It was purchased from the same company which supplied the dry batches.

Quantities and Personnel

A total of 76 different items were included in this contract, the major ones being:

Earth excavation	2,793 cu. yds.
Rock excavation	1,147 cu. yds.
Borrow	3,507 cu. yds.
Broken stone for base	2,035 tons
Class A concrete	490 cu. yds.
Class B concrete	199 cu. yds.
Concrete sidewalks	11,180 sq. ft.
Granite curbing	1,710 lin. ft.
Deformed steel bars	46,030 lbs.
Portland cement	2,419 bbls.
Shotcrete	150 sq. yds.

John Mozzochi was Superintendent

for the Charter Oak Construction Co., Inc., supervising the work of about 40 men. A. A. Mitchell was the Inspector on the job. W. M. Jones was Resident Engineer for the Connecticut State Highway Department, which is headed by William J. Cox, Commissioner. Arthur W. Bushell is Deputy Commissioner and Chief Engineer, and Leslie G. Sumner is Director of Engineering and Construction.

Robinson Staff Changes

Changes in the executive personnel of the Robinson Clay Product Co. were announced recently by W. E. Robinson, President of the Akron, Ohio, company. S. V. Saginor will become Vice President and a member of the board of directors. Mr. Saginor previously was General Manager of The Davey Compressor Co. The retiring Vice President and Treasurer is Thomas Rockwell, who has been with the company for 43 years. Paul V. Robinson, now Secretary, will be Secretary-Treasurer.

Weed Killer Dooms A Waterway Blocker

The waterway-blocking hyacinth has apparently met its match in a liquid weed killer developed by the U. S. Army Corps of Engineers. Known as 2, 4-D, or dichlorophenoxyacetic acid, the chemical is being used during experiments in the Hillsboro Canal in the Florida Everglades, under the direction of L. S. Evans of the U. S. Department of Agriculture and Dr. R. V. Allison, Director of the Florida Everglades experiment station.

So far, the work shows that the concentration used, about 2 gallons of chemical in 8 gallons of No. 2 fuel oil to the mile, is not injurious to human beings, livestock, or fish.

Hyacinths in the canal reach a height of 50 inches and there are about 2,000,000 plants to a linear mile, the experimenters said. Numerous concentrations of 2, 4-D at varying rates of application show progressive deterioration of the plant tissue. The decaying residue

which results on the water's surface sinks in about eight weeks.

The liquid is sprayed from a plane flying 3 or 4 feet above the canal early in the morning or late in the day, whenever the weather is more favorable. A small boat with a sprayer covers isolated spots. Several half-mile stretches have been successfully sprayed, and funds have been appropriated now to clear approximately 100 miles of the canal, though experiments are continuing to determine still-unknown factors.

AGC Convention

Officers for 1947 will be installed by the Associated General Contractors of America, Inc., at its 28th annual convention, January 27-30, at the Stevens Hotel, Chicago. Forrest W. Parrott, 1946 Vice President of the AGC, has been nominated for President in 1947. He is associated with the C. F. Lytle Co., Sioux City, Iowa. Dwight W. Winkelmann, of Syracuse, N.Y., has been nominated for Vice President.



Case Highway mower on Model "VAI." Above is Model "DI" with hydraulic loader.

See Your Case Industrial Dealer for latest information on the four sizes of Case industrial tractors, also on cranes, loaders, mowers, snow-plows, and all manner of tractor-mounted equipment. Take advantage of his trained personnel and shop facilities to keep your present equipment ship-shape. Let his varied experience help plan purchases of new equipment for the long pull ahead. Case "VAI" and "VAIW" tractors are in regular production; keep in touch with your dealer about outlook for larger sizes.

No Pampering

Ask the man in the driver's seat why he likes a Case Industrial Tractor. Chances are he will mention the eager way it wades into its work. He means its velvet vigor as the clutch takes hold, the extra lugging power of its engine when slowed down to pick up its load or pull through a tight spot. He may speak of its convenient controls, its combination of stability and sure-footed traction with quick steering and compact construction.

Ask the man in the maintenance shop and he will comment on its comparative freedom from even minor mechanical difficulties, its extra thousands of hours before major overhaul. He may mention its sustained economy of fuel and lubrication, or its extra strength in vital parts plus provision for easy adjustment or renewal when wear finally occurs.

To the man in the office these things add up to faster progress on the job, lower over-all costs for labor, upkeep and investment charges. They are why Case Industrial Tractors are held in the highest esteem among men with the most tractor experience. J. I. Case Co., Racine, Wis.

CASE



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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Concrete Subcontractor

Held to Be "In the Clear"

If a general contractor knew that a subcontractor was pouring concrete when the temperature was below 40 degrees, in violation of specifications, the subcontractor's right to pay was not affected. So decided the California District Court of Appeal in the case of Fielding & Shepley, Inc., v. Dow, 163 Pac. 2d 908. Nor was the subcontractor liable for failing to take slump tests which were not provided for by the subcontract, especially since tests were taken by others and were not objected to or found unsatisfactory by the general contractor.

Having permitted the subcontractor to mix calcium chloride with the concrete, the general contractor precluded himself from asserting a violation of the specifications in that respect. Nor could he complain that concrete was poured during rain, also contrary to specifications, where rain spots in the concrete did not cause rejection of the work.

The court also applied this well established rule of law: a contract clause which requires work to be done to the satisfaction of the other party to the agreement merely means that the work will be such as to be satisfactory to a reasonable person.

It was also decided that, by taking possession of a concrete substructure and erecting a superstructure upon it, a general contractor accepts the substructure as complying with the subcontract under which it was constructed.

Printed Spex Misleading.

But Acts Showed Intent

Two valuable object lessons in the preparation and carrying out of construction contracts are to be found in the opinion of the Louisiana Supreme Court in the case of L. P. Davis Construction Co. v. Board of Commissioners, 21 So. 2d, 753. Hint No. 1: General printed specification forms should not be used without checking them to discover and eliminate inappropriate clauses. Hint No. 2: When the wording of a contract provision is vague, the intention of the parties may be ascertained by considering how they mutually dealt with each other as the work progressed. (The courts speak of a "practical" interpretation of a contract, where the wording is doubtful, in the light of the actions of the parties. It is one instance where, in law, "actions speak louder than words".)

Plaintiff construction company contracted to build a lower-line back levee for a Louisiana levee district. Printed forms were used. They included a clause which called for payment on the basis of five-sixths of the actual yardage of material moved, one-sixth being allowed for shrinkage in the height of an embankment. But the evidence showed that the specifications had been drawn for use in constructing front-line levees. Nevertheless the district authorities insisted that the clause governed computation of the contractor's pay.

However, the evidence also showed that as the work progressed the contractor had been paid all but the last two installments of the price on the borrow-pit measurement of nine-tenths of the actual yardage removed. Deciding that the contractor was entitled to be paid, on that same basis, the balance due on the contract, the Supreme Court said:

"The plaintiff at the time he presented his bid did so with the understanding that he would be paid on the borrow-pit measurement. This method was followed in all of the payments except the last two. The interpretation placed on the contract by the parties under the circumstances must prevail."

Damage Claim Sustained

Instead of Price Recovery

There is a distinction in public-contract cases between the facts that (1) entitle the public body to withhold or reclaim the full price of the contract, now rendered void, and those that (2) limit the remedy to a claim for damages. This distinction is pointed out in a case decided by the California Supreme Court. (104 Pac. 2d, 30.)

One item of a city's claim to recover money paid for a paving job was based upon averments that the contractor never intended to do the work according to specifications, bribed one of the city's inspectors to disregard his duties, neglected to mix cement properly, etc. The Supreme Court noted that the contract job had been completed and the price paid. It declared that the facts averred, if true, merely entitled the city to

damages sustained, and not to recovery of the contract price.

It presented a different legal situation, the court said, from that presented in an earlier California case. There a county cancelled an unperformed contract, and the contractor unsuccessfully sued to collect damages as for breach of the contract. In that case the cancellation was held to have been justified because the contractor had increased his bid by a sum equal to the difference between the par value and the market value of bonds which he was required to take in payment. (294 Pac. 1082.)

Contractor Slows Own Job; Delays Required Bid Data

Bidding specifications for a Government construction project required that bidders submit complete data on material and apparatus to be furnished, its manufacturer's name, its physical characteristics, etc. Failure to furnish such data was declared to be cause for rejecting the bid. The successful bidder did not comply with that requirement, but after the contract was awarded the Government required the data to be furnished. Under such circumstances, the United States Court of Claims decided that resulting delay in commencement of work was chargeable, not to the Government, but to the contractor. The contractor, therefore, was not entitled to damages he claimed on a theory that he had been delayed in commencing work through the Government's fault. Said the Court of Claims, in part:

"It is true that defendant [the Government] did not avail itself of its right to reject

plaintiff's bid for failure to furnish the necessary data, but it did not relieve plaintiff of the obligation to furnish it before the material was ordered and installed, as was required by General Condition 17 of the specifications." (Sachs v. United States, 63 Fed. Supp. 59.)

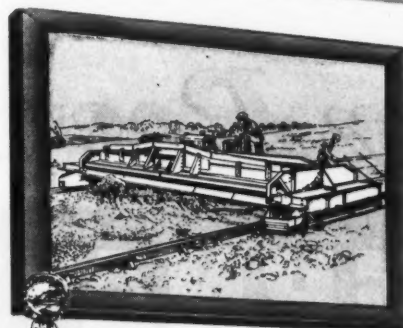
Furnisher of Materials

Defined as Subcontractor

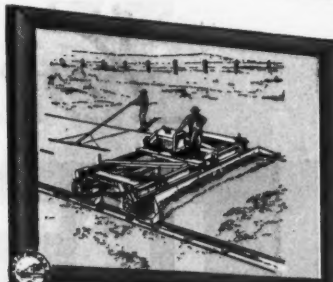
The Tennessee Workmen's Compensation Act provides that a principal or intermediate contractor or subcontractor shall be liable for compensation for injury to a subcontractor's employees to the same extent as the injured man's immediate employers. But the statute provides that every claim for compensation under the provision must be first instituted against the immediate employer of the injured person.

In a case lately decided by the Tennessee Supreme Court, it was contended that a

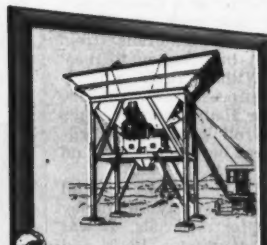
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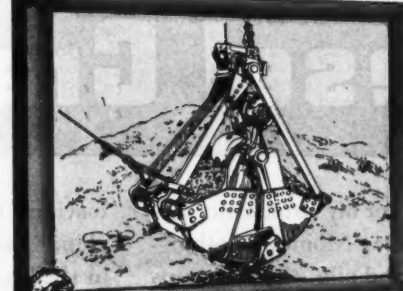
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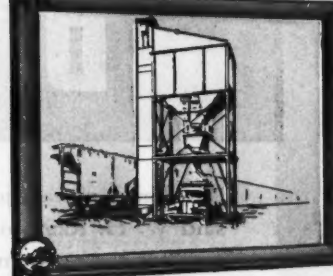
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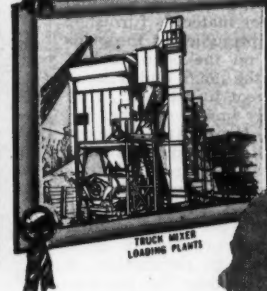
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BLAW-KNOX

CONSTRUCTION EQUIPMENT

Avoid Legal Pitfalls

(Continued from preceding page)

furnisher of materials—in this case, crushed stone—was not a "subcontractor" within the meaning of the statutory provisions. The court ruled to the contrary. It noted that while the State's mechanics' lien law specifically differentiates between "contractors" and "materialmen", no such distinction is made in the Workmen's Compensation Act. The opinion says: "Contractor is one who, for a consideration, undertakes to carry out any part of a project, whether it be to construct a chemical plant or to construct a road incident to the chemical plant, or other employment. We therefore think that a furnisher of stone for the roadway incident to said plant is a subcontractor." (McVeigh v. Brewer, 189 S. W. 2d, 812.)

Contractor Given a Say In Subcontractor's Debt

Beck, general contractor on a Government job, sublet part of the work to Henry. Henry bought necessary materials from Carroll, who also lent him money to meet payrolls on the job. Without Beck's knowledge or consent, the proceeds of checks he issued to subcontractor Henry were credited by Carroll on the payroll loans (in accordance with the agreement between Henry and Carroll).

Litigation followed in which Carroll claimed from Beck and his surety the money that Henry owed him for materials. It was decided that general contractor Beck and his surety were entitled to have the payments made to Henry recited by Carroll to discharge what Henry owed him for materials. (United States v. Beck, 151 Fed. 2d, 964.)

In rendering the decision, the United States Circuit Court of Appeals, Sixth Circuit, fully recognized this general rule of law: that a debtor who owes two or more matured debts to a single creditor has a right to require the creditor to apply a payment to whichever debt (he, the debtor, selects). "The federal cases, however," declared the court, "generally deny the debtor's power to control application, insofar as the interests of others are affected, when the creditor knows where the money comes from. . . . To allow a creditor to collect an old debt out of the monies paid upon a contract, and to leave the charges for materials furnished outstanding, is to the prejudice of the principal and the surety on the bond, and of other beneficiaries of the bond, and if sanctioned might cause great injustice. . . ."

"We think it entirely immaterial that the money borrowed by Henry [the subcontractor] was devoted to the payment of labor on the job. For even if Carroll [Henry's creditor] had paid for labor directly instead of loaning money to Henry for that purpose, he would have been in no better position with respect to the funds provided by Beck [the general contractor] in satisfaction of Henry's claim for work under the subcontract. The rule is clear that one who loans money to a contractor, even if it be for the payment of laborers and material men, is a mere volunteer, is not subrogated to the rights of laborers or material men, and acquires no lien thereby."

Contractor's Failure To Appeal Engineer's Ruling

A contract to construct an outlet channel, to by-pass excess water at a Government dam, contained a clause to this effect: if the contractor considered that work required of him by the engineers was not covered by his contract, or if he deemed any ruling of the inspectors or the contracting officer unfair, he could protest to the contracting officer; and if dissatisfied with that officer's ruling on the protest, he could appeal to the Chief of Engineers. Dispute arose over the kind of material to be used on a rolled fill, and the contractor asked the project engineer for instructions. These were refused by the project engineer on the ground that the contract spoke for itself.

In subsequent court proceedings, the contractor contended that it was not necessary to appeal from the engineer's action, because he did not rule but refused to rule. The United States Court of Claims rejected this contention and said: "If plaintiff, having asked for them, had been refused written instructions, this fact alone could have properly formed the basis of a protest and a subsequent appeal. If the project engineer, as the authorized representative of the contracting officer, had refused to make a decision, a different question would have been presented. But he made a prompt decision, which was to the effect that no written instructions were necessary other than those embodied in the contract."

Accordingly, the Court of Claims decided

that the contractor, in order to preserve his rights, should have appealed from the engineer's ruling during the progress of the work. (E. J. Albrecht Co. v. United States, 63 Fed. Supp. 769.)

Mutual Consent Implied In Contract Abandonment

If there is no statute requiring written evidence that a contract has been abandoned, the fact may be shown in other ways: by proof of an oral agreement, or by circumstances from which abandonment reasonably may be inferred. An example is afforded in a case decided by the Pennsylvania Supreme Court. (Weldon & Kelly Co. v. Pavia Co., 46 Atl. 2d, 466.)

A contractor on a housing job sublet construction of sewers and the excavation and backfilling of water-line and gas-line trenches. The work was to be completed by September 24, 1942, the same time allowed for performance of the principal contract. The sewers were substantially complete by

late October. But the subcontractor could not proceed with the trenches because the general contractor had not secured the pipe to be laid, due to priority difficulties. The subcontractor therefore removed its equipment to another job. About six months later, the general contractor started excavating the trenches without consulting the subcontractor and after having changed the plans somewhat.

In litigation that followed, the Supreme Court intimated that the subcontractor was entitled to rescind the subcontract, because it "could scarcely have been expected to keep its equipment idle on the job for an indefinite period, especially in the midst of war when there was an almost frenzied demand for labor and for all kinds of mechanical equipment". But the court said that it was not necessary to rest a decision in the subcontractor's favor merely on that ground. It said that the facts, partly detailed here, showed that the general contractor impliedly acquiesced in an abandonment of the subcontract.

Stockpiled Material Wet; No Pay for Dry Substitute

One clause of a contract with the Government to construct an outlet channel, dealt with rolled fill. It provided that if the contracting officer judged the material too wet to secure necessary compaction, rolling should be delayed until the material dried sufficiently. It also provided that excessively wet materials should be stockpiled until their use was authorized, and that no additional pay would be allowed for such stockpiling, or for hauling the material to its final position on the job. Dismissing the contractor's claim against the Government for extra compensation, the United States Court of Claims said:

"The rulings made . . . by the contracting officer and the district engineer . . . to the effect that the Government could not incur extra excavating expense for plaintiff to excavate dry material from borrow pits merely because the stockpiles had too high a moisture content to use at the time for rolled (Concluded on next page Col. 4)

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● "This is an easy job for my International," said W. H. Kamp of Des Moines, Washington. He was removing and piling large stumps at Skyway Park, a housing project southeast of Seattle.

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For evidence of the durability and matchless operating economy of these powerful crawlers, look at Mr. Kamp's TD-18. It is 4½ years old, has given almost 10,000 hours of trouble-free performance and still has not had the pan off! In that time it has yarded logs—hauling 25,000 board feet per day on 45% grades—and has done plenty of earth moving. At Skyway Park it built 7,000 feet of streets in 20 days of extremely wet Washington winter. This included opening up and clearing the land. Some stumps removed were ten feet in diameter and some of the rocks weighed as much as five tons. "This

machine is just as true today as a new machine", says Mr. Kamp. "It is not sprung in the least and has never been off the tracks once. It has plenty of power. In fact, I do



Mr. Kamp gets a big stump moving with his TD-18 and bulldozer. Note how the International's oscillating tracks keep the crawler poised to follow through.

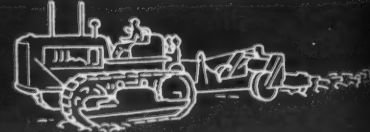
jobs like this with the throttle only ¾ open."

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Garlinghouse Expands Distributor Facilities

In conjunction with the recent separation of its manufacturing and dealer activities, Garlinghouse Brothers of Los Angeles has announced plans for expanding its distributor services in the southern California area. The firm, with A. F. Garlinghouse as Manager and R. W. Whitaker as Sales Manager, is now devoted solely to distribution of industrial equipment; manufacturing activities are handled by other Garlinghouse divisions. A new sales and service building is planned for Washington Blvd. It will cover a minimum of 20,000 square feet, with added square footage in a second story at the front for office purposes.

Some of the companies represented exclusively by Garlinghouse are: American Conveyor Co., Browning Crane & Shovel Co., Davey Compressor Co., Diamond Iron Works, Inc., Drake-Williams-Mount Co., Electric Tamper & Equipment Co., A. Leschen & Sons Rope Co., McKiernan-Terry Corp., and Novo Engine Co. Other lines are handled on other than an exclusive basis.

AGC and Aviation Heads Form New Liaison Group

The establishment of a Joint Cooperative Committee between the National Association of State Aviation Officials and The Associated General Contractors of America has been agreed upon at a meeting of representatives of

both organizations in Washington. The committee will seek to effect a closer organization and better understanding between aviation officials and contractors. In this way, it is felt, practical means can be developed for improving efficiency and economy in airport construction.

Cooperation between officials responsible for the design, preparation of plans, award of contracts, and administration of airports, and the contractors who will do the grading, paving, erection of buildings, and installation of necessary utilities, is considered essential if the Federal Airport Act program is to be carried out efficiently, and if the public is to receive the maximum in airport construction for the funds invested.

Avoid Legal Pitfalls

(Continued from preceding page)

fill, were not an unreasonable application of the terms of the contract. . . . There was no warranty under the contract as to the degree of moisture content or how long it would take the excavated material to dry to the point where it could be used for rolled fill. This would naturally depend upon weather conditions and the manner in which it was stockpiled." (E. J. Albrecht Co. v. United States, 63 Fed. Supp. 769.)

How Does Your Policy Read? How Broad Is Its Coverage?

Just as many of us never think of reading the Bible until we are lying on a sickbed, many of us never think of reading our insurance policies until we commence wondering whether they cover a loss that has just occurred.

Our reading of many appellate court decisions concerning the coverage of contractors' policies leads us to suggest that no liability policy should be filed away until the contractor is sure that the coverage is broad enough to include all of his operations, excepting as other policies are clearly sufficient to that end. Apparently, a South Carolina highway contractor omitted to so assure himself.

The contractor protected himself by insurance against operations described as road construction, reconstruction, right-of-way clearing, filling and grading. According to a decision later rendered by the South Carolina Supreme Court, the contractor fell down in failing to include the one word, "maintenance," or its equivalent. The contractor became liable for an injury to a traveler which occurred about 12 miles from the place where road work was then in progress. It occurred, however, because of a defect on an 18-mile stretch he was required by contract to "maintain".

The Supreme Court held that the liability policy, as worded, limited the insurance company's liability to injuries arising out of actual construction work. The fact that the particular contract required the contractor, in addition to such work, to maintain the entire stretch, was not to be regarded as "construction" work. (S. S. Newell Co. v. American Mutual Liability Ins. Co., 199 S. C. 325, 19 S. E. 2d, 463.)

Time Checker Not Covered By Wage and Hour Law

A plaintiff was employed by the defendant, a company engaged in local construction. His duties consisted of collating and summarizing reports of timekeepers as a means of checking wage payments to be made to subcontractors. Occasionally he sent letters and made telephone calls to subcontractors in other states. He sued the company to collect wages for overtime work and damages because he was not seasonably paid under the Federal wage laws. Judge Kalodner of the United States District Court for the Eastern District of Pennsylvania ordered the suit dismissed. He held that the plaintiff was not engaged in "commerce" or the "production of goods for commerce" within the meaning of the Federal Fair Labor Standards Act. (Damon v. Fird, Bacon & Davis, Inc., 62 Fed. Supp. 446.)

The court did not decide whether an employee whose principal work consists of writing letters to his employer's correspondents in other states would come under the provisions of the Act. It merely declared that where such work comprises an unsubstantial part of an employee's duties, it does not bring him within the law.

O.K. a Binding Acceptance

In an oral conference, a contractor offered to construct work on specified terms. The other party said "O.K.". That was all that was necessary to make a binding contract, declared the California District Court of Appeal in the case of Grimes v. Nicholson, 162 Pac. 2d 934.

The fact that it took a lawsuit to settle the question suggests that it is better to use a bit more explicit wording: for example, "I accept your offer". But no special formality or formula is required, such as, "Do you take this job, for better or for worse?" "I do."

Delayed-Payment Interest

A delay occurred in making final payment to a parkway contractor. The New York Court of Claims decided that interest should be allowed, the work having been accepted, after a reasonable time had expired for completing measurements and preparing the final estimate. (A. W. Banko, Inc. v. State, 60 N.Y. Supp. 2d, 758.)

for Land Clearing

Roots out of the ground and pointed skyward. The International Diesel, under Mr. Kamp's experienced hand, rivals Paul Bunyan in stump removal. In two more minutes the stump's in the pile for burning.



Industrial Power



Road Grade Raised As Flood Protection

Section of U. S. 1 Gets 5-Foot Lift on Selected- Gravel Fill; Temporary Macadam Paving Added

★ **TIDEWATERS** of the Potomac River sometimes back up into Hunting Creek, one of its tributaries, at flood stage. They are often accompanied by a strong east wind. The almost inevitable result has been the flooding of a low section of U. S. Highway 1 on the south shore of the creek immediately below Alexandria, Va. This has been a serious threat to normal traffic on the main artery to the south from Washington, D. C. To stop it, the Virginia Department of Highways raised the grade on a 1,839-foot section of the road a minimum of 5 feet last spring, elevating the top of the road above all previously recorded high water.

The work was performed by Robert T. Main, Jr., a contractor from Roanoke, Va., who was awarded the job on his low bid of \$72,800. The new fill, composed of selected-gravel borrow, has been paved with bituminous macadam. But it will eventually be replaced with concrete like the rest of U. S. 1 in this area, after sufficient time has elapsed for any settlement to take place in the new embankment.

Flooding of the road has occurred only on the south side of the creek where the bank is low. Accordingly the improvement began at the south end of the Hunting Creek Bridge, a concrete structure which has a roadway of two 25-foot lanes separated by a 4-foot median strip. It continued in a southerly direction until higher ground was reached far from the flood plain of the, at times, unruly creek. Prior to this work the grade of the old road took rather a sharp dip immediately after crossing the span, but the new approach is practically at bridge level.

The original road was built in 1921 and widened 10 years later to 22 feet. But a steady increase in traffic warranted the construction in 1939 of another 22-foot lane converting U. S. 1 into a dual highway. In order to maintain traffic during the recent reconstruction, the grade of the southbound lane was raised first and the pavement laid before any work was done on the northbound lane.

Selected-Gravel Fill

Grading operations started on March 21, 1946. A Lorain ¾-yard shovel dug the selected gravel for the fill from a borrow pit opened 5 miles from the job. The material was hauled in 1½-ton dump trucks, hired by the hour, and numbering as many as fifteen at the peak. After the trucks dumped the granular borrow on the concrete road, a Caterpillar No. 12 power grader spread it in 8-inch layers. It was compacted to maximum density by a dual-drum sheepsfoot roller pulled by a Caterpillar D7 tractor. The total yardage, 22,525, of gravel included sufficient material for building 12-foot shoulders. These were shaped to a slope of ¾ inch to the foot.

Macadam Pavement

After the 5-foot fill had been laid and thoroughly compacted, two 5-inch layers of crushed stone were laid on top of the gravel to a width of 24 feet. The base-course stone, graded from 3½ down to 2 inches, was purchased from the Arlington Asphalt Co. The firm shipped it from the Leesburg, Va., plant 35 miles over the Washington & Old Dominion railroad to a siding within 2 miles of the job. Here a Lorain crane, equipped with a 30-foot boom and a

Williams 1-yard clamshell bucket, unloaded it from gondola cars and either loaded it into trucks or stockpiled it for further use.

Five trucks were used to haul the stone, which was spread on the fill by the power grader. After the lower 5-inch layer was in place, stone dust from the same source was spread over the stone and worked well into the cracks with hand brooms so that the interstices were filled all the way to the bottom of the course. The same procedure was followed on the top layer. Each course was separately compacted by a Buffalo-Springfield 10-ton 3-wheel roller.

This was as far as the work of the prime contractor extended. The bituminous paving operations which re-

(Concluded on next page)

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BLACK TOP PAVER

Road Grade Raised As Flood Protection

(Continued from preceding page)

mained were done by the Arlington Asphalt Co. of Leesburg on a subcontract basis. First a prime coat of cut-back asphalt was applied to the water-bound macadam base at the rate of $\frac{1}{2}$ gallon to the square yard. Then it was covered with stone chips, $\frac{1}{8}$ -inch size, spread 15 pounds to the square yard. The day after this first cover was put down, more cut-back asphalt was distributed, this time at the heavier rate of $\frac{3}{4}$ gallon to the square yard; it was covered with chips which were spread 75 pounds to the square yard. Asphalt and stone were then mixed in place into a bituminous mat by means of the blades on a planer which was pulled over the road by the tractor. After several passes of the planer to insure thorough mixing, the mat was rolled by the smooth-wheel roller, and then covered with a layer of sand. After that, the road was opened to traffic.

When the southbound lane had been completed, the northbound lane was similarly constructed. Each 24-foot macadam surface-treated pavement has a center crown of $\frac{1}{4}$ inch to the foot. They are separated by a grass parkway from 4 to 20 feet wide. Highway maintenance forces will later strengthen the 2 on 1 fill slopes with concrete rubble for riprap. The 1,839-foot improvement was completed in June, 1946.

Quantities and Personnel

The major items included in this grade-raising project were:

Selected-gravel borrow	22,525 cu. yds.
Pipe underdrain, 8-inch	1,620 lin. ft.
Waterbound macadam	14,792 sq. yds.
Bitumen	14,623 gals.
Stone chips	925 tons

Robert T. Main, Jr., acted as his own Superintendent on the grading and laying of the stone base course. For the Virginia Department of Highways, W. Frank Smith was Resident Engineer on the project assisted by Inspector A. J. Farley. The Department is headed by James A. Anderson, Commissioner, with C. S. Mullen, Chief Engineer, and T. F. Loughborough, Construction Engineer.

Heavy-Duty Grader

A 100-hp grader weighing 28,000 pounds has been announced by the Rome Grader & Machinery Division of The Union Fork & Hoe Co. The manufacturer says that it was designed to do double the ordinary work with only 5,000 pounds of increased weight; to make extra-heavy cuts; and to have power sufficient to prevent stalling in the heaviest going.

The blade of the Model 4-0-4 is 12 feet long and 22 inches high, and it can be lifted 17 inches above the ground. Hydraulic power is employed for lift



The Rome 100-hp grader, the Model 4-0-4, is designed to make extra-heavy cuts. It weighs 28,000 pounds and employs hydraulic power for lift and steering.

and steering. The grader has a 6-cylinder 4-cycle diesel engine which develops at full load 1,600 rpm. It has

eight forward and two reverse speeds. Complete details with on-the-job photographs are to be found in a bul-

letin which you may obtain by writing to the company at Dominick and Union Sts., Rome, N. Y. The bulletin also contains specifications on the 4-0-3, which has the same general construction as the Model 4-0-4 except in weight and capacity.

New Davey Vice President And Western Distributors

The election of J. T. Myers as Vice President in charge of sales and production of the Davey Compressor Co., Kent, Ohio, was recently announced. Mr. Myers formerly held the position of Assistant General Manager.

The company has also appointed F. S. Ray Co. distributor of the complete Davey line; the firm is located at 7515 So. Main St., Houston, Texas. And Davey has named the Claude B. Smith Co. a distributor for northern California. Service facilities will be available, as well as a fleet of rental compressors. The Claude B. Smith Co. is located at 615 Sansome St., San Francisco.



\$7½ billions of heavy construction in 1947! Millions and millions of tons of aggregate will be needed.

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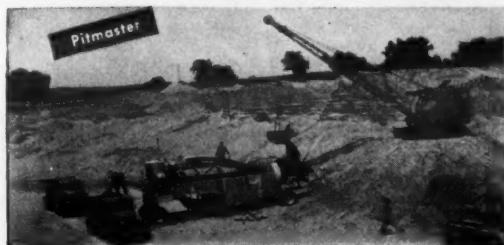
- 100 to 150 tons per hour of 1" material are easy for the big Cedarapids Master Tandem.
- The Cedarapids Junior Tandem is similar to the Master but smaller in size.
- The Cedarapids Pitmaster is our smallest portable straightline crushing plant but owners say there's nothing small about its production.
- The Cedarapids Unitized Plant is the most versatile, portable crushing, screening and washing plant ever offered. Will handle rock or gravel, dry or washed—with almost any desired capacity.
- The Cedarapids Portable Hammermill plant is the ideal unit for large production of agstone and road stone.

See your nearest Cedarapids dealer for details. When you buy a crushing plant—buy the best—buy Cedarapids.

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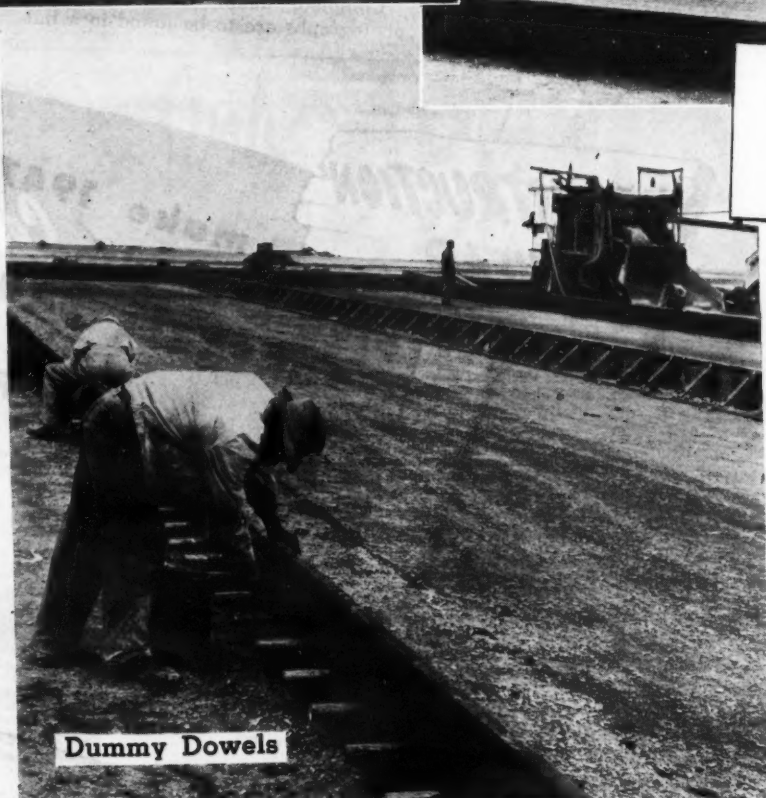
Concrete



Finegrading

Subgrade for the concrete parking apron, taxiways, and a portion of new runway at the Fairfield-Suisun Army Air Base in California was compacted for 12 inches to 100 per cent optimum density before the crushed-rock base course was laid. This attention to subgrade, as well as the 18 to 27-inch concrete slab, is part of the design to provide the necessary strength for giant cargo planes of 300,000 pounds which are typical of modern air traffic. Above, a Caterpillar motor grader and a Gallion roller are engaged in subgrade preparation.

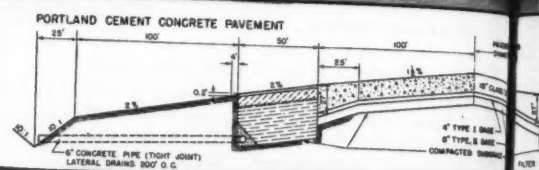
At mid-height along the forms 2-inch-round x 8-inch-long dummy dowels were fastened to the forms by screws extending through the forms. Before the forms were removed the screws were taken out; they were then put back into the dowels and the dowels removed. Into the holes thus formed, 2 x 16-inch steel dowels were placed before concrete in the adjoining slab was poured. At right, workmen give the dummy dowels a heavy coating of grease to prevent their sticking to the concrete.



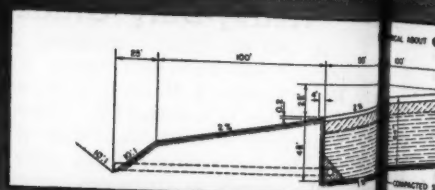
Dummy Dowels

Below, heavy 18-inch Blaw-Knox steel forms, 15,000 feet of which were available on the job, are unloaded from a flat-bed truck by a Handi-Crane mounted on a Case tractor. The giant ATC cargo plane nearly 900 feet beyond the equipment is typical of the heavy airplane traffic using the Fairfield-Suisun Air Base.

Forms



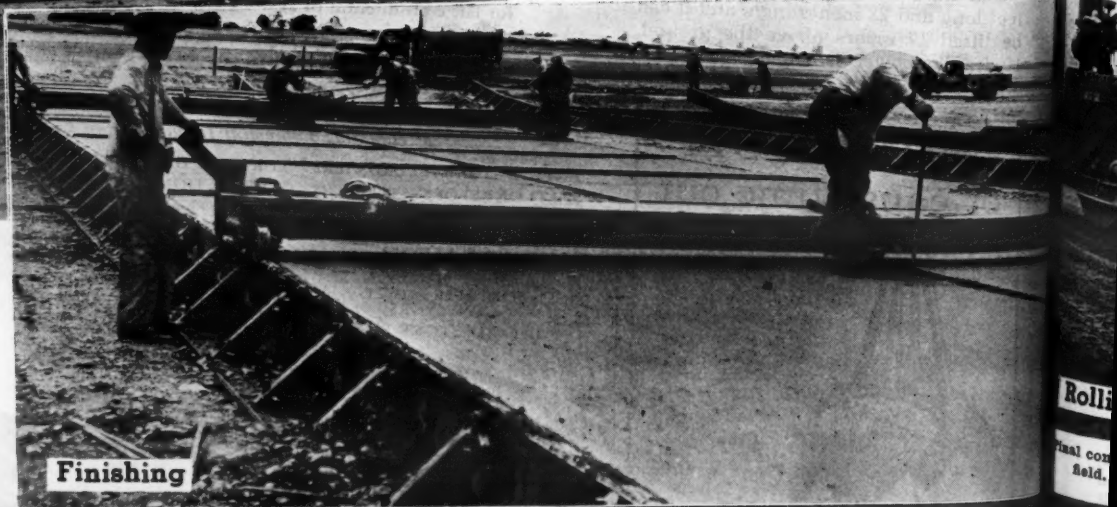
at Army
Designed
for Heavy



Paving

Two 34-E pavers, one on either side of the 25-foot strip, placed the 1½-inch-slump concrete. The stiff mix was distributed by a Blaw-Knox spreader and vibrated by six Viber electric internal vibrators.

Final finishing and joint-edging go on apace at the right. When completed, membrane curing compound was sprayed on the slab. This concrete paving at the Fairfield-Suisun Army Air Base was done by Morrison-Knudsen Co., Inc., under the direction of General Superintendent A. H. Johnson.



Finishing

Rolli

Final con
field.

Bituminous



Sub-Base

Minus 3-inch crushed rock was used as sub-base under the hot-mix paving at the Fairfield-Suisun Army Air Base in California. At left, a motor grader spreads the rock which, put down in 6-inch layers, eventually reached a compacted thickness of 66 inches from sub-grade to paving.

A feature of the rock-blanket preparation for the bituminous paving was the care in compaction. After every 18 inches went down and was rolled, a special compaction unit was called in. This "Gismo", as it was known, shown in the center of the photo below, is mounted on six rubber tires, is ballasted by iron bars, and weighs 300,000 pounds.



Compaction

Paving Air Base Heavy Loads



Spreading

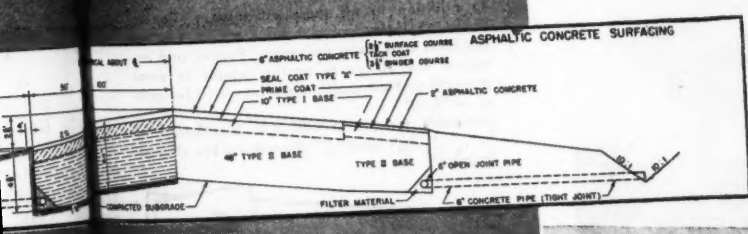
A fleet of six trucks made a 1-mile run from the hot-mix plant to the field and delivered their loads to a Barber-Greene Tamping-Leveling Finisher. Binder course 3½ inches deep was given a seal coat of emulsified asphalt. Then the surface course of 2½ inches compacted thickness was placed.

(See Article on page 6)
(C. & E. M. Photos)



Rakers

Above, two rakers finish off a construction joint in the bituminous paving. A beveled board made possible a square joint in the paving while allowing the roller to work right up to the joint.

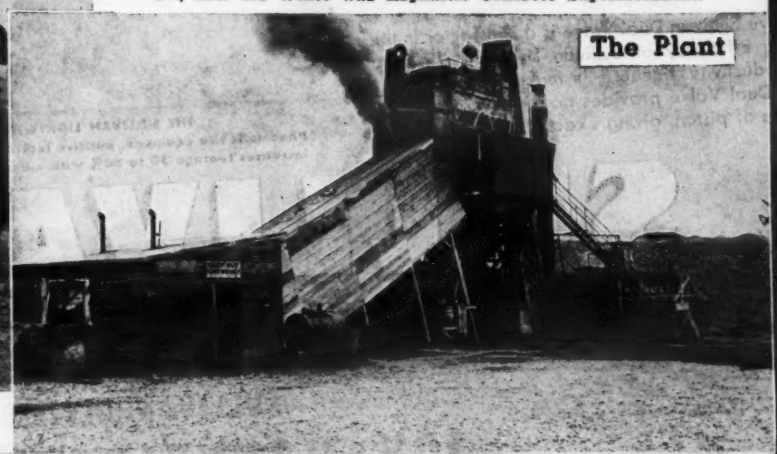


The Standard Steel plant, shown below, for preparation of the hot-mix at Fairfield-Suisun Air Base produced 3,000-pound batches. The bituminous as well as the concrete paving at this Army Air Base in California was done for the U. S. Engineers by Morrison-Knudsen Co., Inc. Ed White was Asphaltic Concrete Superintendent.



Rolling

Final compaction of the hot-mix was handled by a new 14-ton 3-axle Buffalo-Springfield. Above, the unit takes on a load of water, to be used later on the rolls.



The Plant

New 3-4-Ton Roller Is a Versatile Unit

The new Wheeler roller, a 3 to 4-ton tandem machine, is now being introduced throughout the nation by Shaw Sales & Service Co. of Los Angeles. The machine is designed especially for efficient low-cost maintenance work on highways, airports, parking areas, driveways, docks, and sidewalks.

The Wheeler roller is powered by an Allis-Chalmers Model B gasoline engine. According to its manufacturer, the new roller combines maneuverability, conservative design, and high frame clearance to make it suitable for finishing close to curbs or walls and in limited working areas.

Shaw Sales & Service Co. is a well known local distributor of several standard lines of road machinery and construction equipment throughout California. But the company has exclusive national distribution rights to the new Wheeler roller. In order to facilitate service to customers, a chain



The new Wheeler tandem roller is designed for maneuverability and easy clearance in limited working areas.

of subsidiary dealers over the nation will handle the new roller through the parent distributor. Arrangements to complete this list of dealers are now under way, and shipments of the new machine to points as far east as New

York have already been announced.

Illustrated brochures of the new roller, with its mechanical specifications, may be obtained by addressing a request to Shaw Sales & Service Co. at 5100 Anaheim-Telegraph Road, Los Angeles 22, Calif. Mention this item in CONTRACTORS AND ENGINEERS MONTHLY.

LeTourneau Sales Force, Eastern Office Changed

The opening of a new office in Washington, D.C., and changes in its sales force have been announced by R. G. LeTourneau, Inc., Peoria, Ill. The address of the new eastern sales office will be 1026 17th St., N.W., 412-413 Defense Bldg., Washington 6, D.C. It will remain under the management of O. A. (Jack) Williams, who received his appointment in the autumn of 1946. Henry Cain is Assistant to the Eastern Sales Manager.

W. B. (Bill) Worden, district sales and service representative for LeTourneau in southern California and Arizona for the past four years, has

been LeTourneau's Central Sales Manager for the company. He succeeds M. E. (Cap) Miller who recently resigned. Mr. Worden's office is at Peoria.

LeTourneau also announces the recent appointment of Harold F. Stenstrom as district sales representative, with headquarters at Memphis, Tenn., serving the states of Missouri, Tennessee, Arkansas, Louisiana, and Mississippi.



HERE'S NEWS for owners and operators of earth-working and processing equipment... a new extruded coating on Stoddy Self-Hardening brings even improved results over the old, time-tried and proven favorite... speeds up welding, assures denser deposits, eliminates porosity! The new extruded coating has far greater strength than dipped coatings—has less tendency to pick up moisture and is completely uniform!

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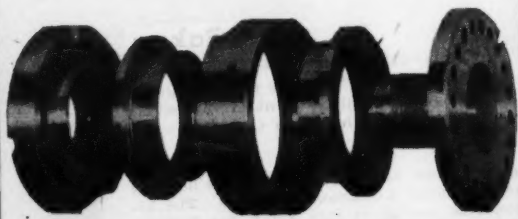
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W&D R500

Two Tunnels Blasted On Reclamation Job

Lowdermilk Brothers of Denver Drives Key Bores East of Adams Tunnel on Huge Irrigation Project

ON the eastern side of the Continental Divide near Estes Park, Colorado, in an area bordering Rocky Mountain National Park, Lowdermilk Brothers of Denver is driving two new tunnels on the Colorado-Big Thompson Project. They are the Rams Horn and Prospect Mountain Tunnels. The Bureau of Reclamation awarded the contract in March, 1946, on bids of \$699,508 and \$1,165,314 respectively.

Rams Horn Tunnel, which was holed through on November 14, will have a length of 6,924 feet and a 10-foot cross section after lining. Prospect Mountain Tunnel, on which construction has been delayed pending completion of Rams Horn, will be 5,650 feet long; it will have a finished diameter of 12 feet 6 inches. Rapid progress has been made by the contractor on the Rams Horn Tunnel; as much as 69 feet of tunnel has been driven through the hard granite in a 24-hour period.

Irrigation Project

The Colorado-Big Thompson Project was authorized by the Congress in 1938. Its purpose was to bring surplus water from the headwaters of the Colorado River to the eastern slope of the Rocky Mountains and provide supplemental irrigation water for 615,000 acres of farm land now inadequately supplied. The two tunnels under construction on this project are links in a chain of conduits, siphons, and penstocks that will carry water from the east portal of the Alva B. Adams Tunnel to the regulating reservoir at Estes Park on the Big Thompson River.

Water will flow from the Alva B. Adams Tunnel into the east-portal reservoir and thence through the Aspen Creek siphon to Rams Horn Tunnel. Leaving the tunnel it will drop approximately 205 feet through steel penstocks to generate 8,100 kw at Marys Lake power plant. This power plant will discharge into Marys Lake for temporary

storage and regulation and then into the 5,650-foot Prospect Mountain Tunnel.

Three penstocks at the downstream portal of this tunnel will be capable of carrying a flow of 1,300 cfs to the Estes power plant, which will have a generating capacity of 45,000 kw. The discharge from this power plant will enter Estes Reservoir from which water will flow into the Big Thompson River. From the Big Thompson it will be carried to farm lands through a system of canals, power plants, and storage reservoirs.

A number of the features of the Colorado-Big Thompson Project have already been completed. On the western slope, Green Mountain Dam and power plant were completed during the war, and the power plant was placed in



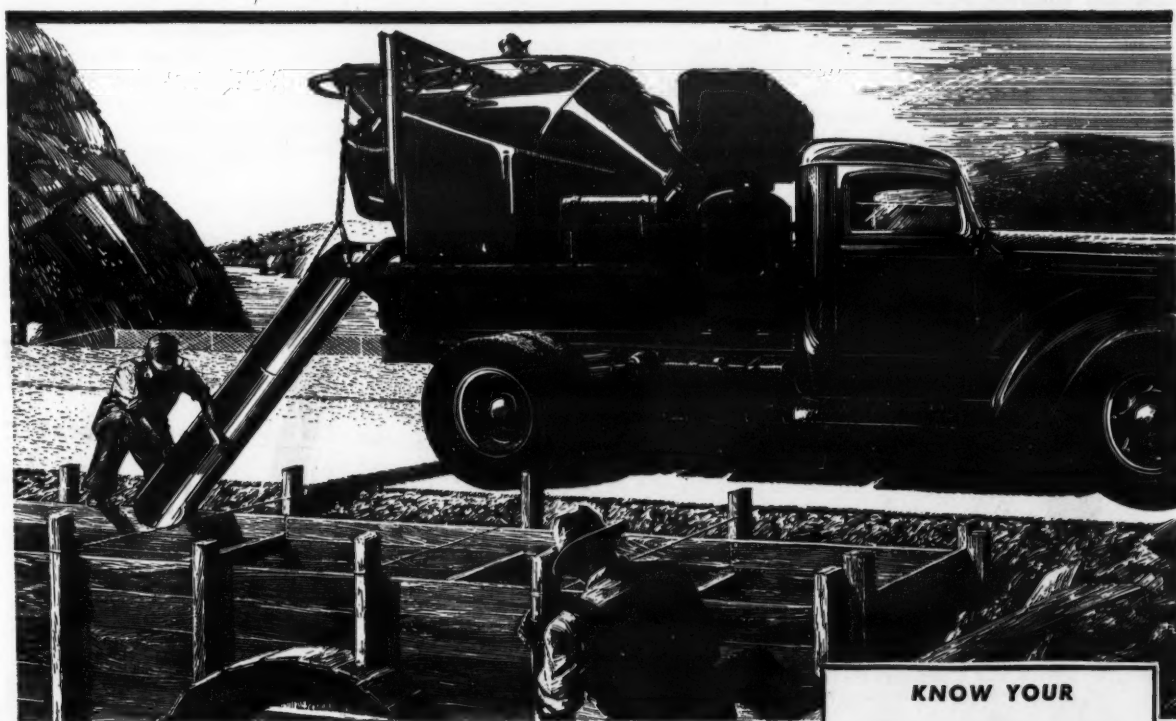
C. & E. M. Photo
Lowdermilk Brothers repair-shop and office set-up at Prospect Mountain Tunnel is pictured here; also the high power head where penstocks will eventually discharge water to the Estes Park powerhouse.

operation during May, 1943. This structure on the Blue River provides compensatory storage of irrigation water for farmers on the western slope. Shadow Mountain Dam, which forms a reservoir connecting with Grand Lake

to provide regulation of water for diversion through the Alva B. Adams Tunnel, was completed in 1945. The 13.1-mile Alva B. Adams Tunnel (see C. & E. M., Jan., 1946, page 2) has been

(Continued on next page)

Hi-Up... IN NAME, REPUTATION AND QUALITY



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Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

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Contractors - Engineers Superintendents - Foremen

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WRITE FOR BULLETIN SR-3.

COFFING HOIST CO.
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Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

Other new design details: Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

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W-7

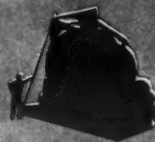
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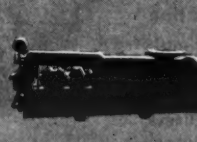
Truck Mixers
Capacities:
2, 3, 4 1/2 cu. yds.



Portable Mixers
Capacities:
3 1/4, 6, 11, 16, 28 cu. ft.



Big Stationary Mixers
Capacities:
28, 50, 84, 128 cu. ft.

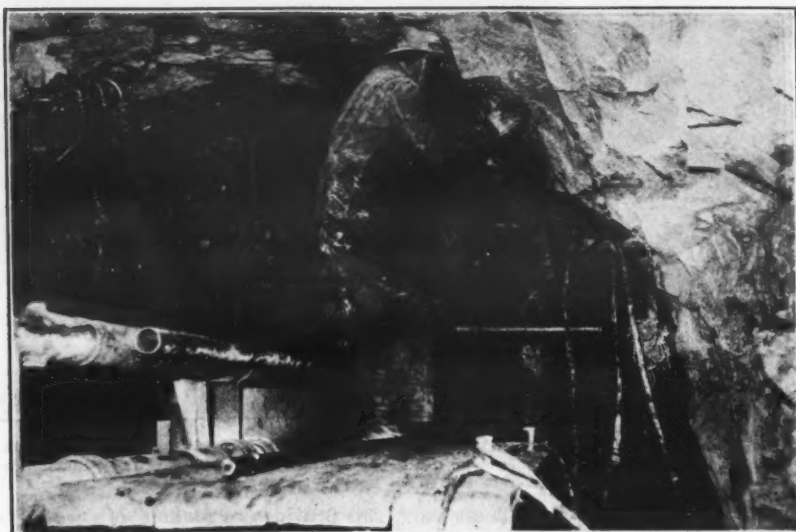


Pneumatic Placer
Capacity:
7, 14, 28 cu. ft.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.



U. S. Bureau of Reclamation Photo
Two drill tenders were able to keep the five drills on the jumbo busy during the Lowdermilk Brothers tunnel job.

Tunnels Blasted

(Continued from preceding page)

bored and concrete lining was completed in February, 1946.

Work on Granby Dam on the Colorado River is again under construction after having been stopped during the war. Granby Reservoir will furnish storage for diversion. The water will be pumped from this reservoir into Shadow Mountain Reservoir; from there it will flow through Grand Lake and into the tunnel through the Continental Divide.

Work Plans, Preparations

Work started April 27, 1946, on Rams

Horn Tunnel, ten days after Lowdermilk Brothers had received the official notice from the Bureau to proceed with the job. The time clause allows 500 calendar days in which to finish both Rams Horn and Prospect Mountain Tunnels.

The contractor originally planned to start the Rams Horn Tunnel bore at the east portal and drill this section through the mountain from that end. At the same time, the contractor also expected to start Prospect Mountain Tunnel, with auxiliary equipment, from the north portal, and bore it far enough to clear the way for construction of a surge tank 200 feet in from the portal.

However, a combination of circumstances put a temporary halt to construction work on Prospect Mountain Tunnel. Reinforcing steel for the con-

crete lining of the surge tank, which is to be excavated in solid rock above the tunnel, was not available. Nor was steel obtainable for the permanent shoring supports for Type B sections. Some timber shores were brought in and used, but their erection was slow, cumbersome, and expensive. Due to these difficulties, Lowdermilk Brothers decided to hold the Prospect Mountain work in temporary abeyance and concentrate activity at Rams Horn Tunnel.

The preliminary examination of rock structure at both tunnel sites had been based on a surface geological report. The geologists had anticipated a granite formation, limited seep water, and clean-breaking blasting conditions—all ideal for tunnel work. The Lowdermilk bid on Rams Horn, including excavation and concrete lining, was approximately \$100 per linear foot for a horse-shoe-shaped section 10 feet in diameter.

An office, a heated change room for the workmen, and a shed to house the compressed-air equipment, were erected near the tunnel portal. An Ingersoll-Rand Imperial Type 10 compressor, rated at 1,400 cfm and powered by a 200-hp Westinghouse 3-phase motor, was set up on the job. To supply power from the main Estes Park-Alva B. Adams power line, the contractor built a ¼-mile transmission line. A 6-inch header, with a 6-inch flexible take-off to the jumbo, was laid from the compressor to supply air for operation of the pneumatic drills.

Preliminary preparations included



U. S. Bureau of Reclamation Photo
Powdermen load holes drilled in the rock face of Rams Horn Tunnel.

laying 36-inch-gage railroad track from the portal to the disposal area, and installation of a 20-inch ventilating header from a Western blower rated at 8,500 cfm. The ventilating header and air pipes, together with a power line for the mucking machine, were supported by steel hangers set in the rock of the tunnel walls.

Tunnel Excavation Methods

The excavation sequence was as follows:

Five Ingersoll-Rand DA-35 power-feed drifters mounted on a drilling

(Continued on next page)



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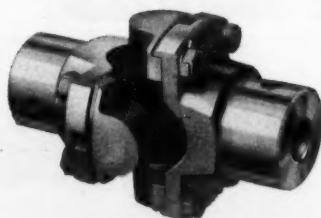
It saves up to ten percent of the operator's time — formerly wasted greasing plain bearing universal joints — cuts down grease costs and avoids expensive breakdowns that are caused by insufficient lubrication

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U. S. Bureau of Reclamation Photo
Blasted rock was taken from Rams Horn Tunnel by this Conway mucking machine.

Tunnels Blasted

(Continued from preceding page)

jumbo moved up to the face of the tunnel. With a drill steel and bit car hooked on to the jumbo, and rolling on the 36-inch-gage railroad, the drills bored an average of 37 holes spaced on a 30-inch grid in the rock face. Lengths of Truscon steel measuring 3, 6, and 9 feet were used, with detachable Timken rock bits. Each time the steel was changed, a new drill bit was also screwed on, for the hard gray granite with streaks of pegmatite dulled bits in 3 feet. Strangely enough, the bits showed no marked tendency to lose gage. They were used six times before they were discarded. Sharpening was done in a Denver shop.

Very little ground water was encountered in drilling, and the 37 holes were bored on an even pattern. Two drill tenders on the steel car behind the drilling jumbo kept five drills busy. With the holes for a round drilled, the drilling jumbo then moved back to a small temporary siding 1,000 feet back of the face.

Du Pont 45 Gelex No. 2 stick dynamite was then loaded in all 37 holes; the explosive was tamped in within 24 inches of the face. In exceptionally hard rock, the center or "pull" holes were loaded slightly heavier than the limit-line holes. An average of 200 pounds of powder was used for each round, which represented about 30 cubic yards of solid rock. Atlas blasting caps were used on each hole. Starting at the center, eight delays of 2/5 second were used towards the wall lines, so the explosion would first pull the center of the rock plug out and break the rest of the rock in towards the opening.

The crew, standing back at least 1,000 feet from the blast, then watched the shifter touch off the explosion with a switch hooked to 220 volts of electrical power. In this day of atomic energy, a dynamite blast is a puny thing, but it was powerful enough to blow the hard hats off the heads of miners 1,000 feet away. It also pulverized the hard gran-

ite rock down to pieces 12 inches in size and under.

When the blast went off, the compressor operator outside the tunnel reversed the direction of the big Western blower, and for 20 minutes the plug of smoke was sucked out. At the end of a 20-minute period, the fan reversed and started sending a stream of fresh air back to the tunnel face. No one was permitted beyond the firing limit during that safety period.

A Conway electric mucking machine then rolled up from its railroad siding farther back in the tunnel, and went to work shoveling the blasted rock to its conveyor belt. Mucked rock was deposited to a fleet of 16 Western side-dump cars, each car hauling 5 cubic yards. Each round of blasting loosened about 8 carloads. The cars of rock were shoved out of the tunnel by Western electric locomotives, and dumped in a designated tippie just outside the east portal of the bore.

The Conway mucker excavated efficiently even in the 10-foot tunnel with

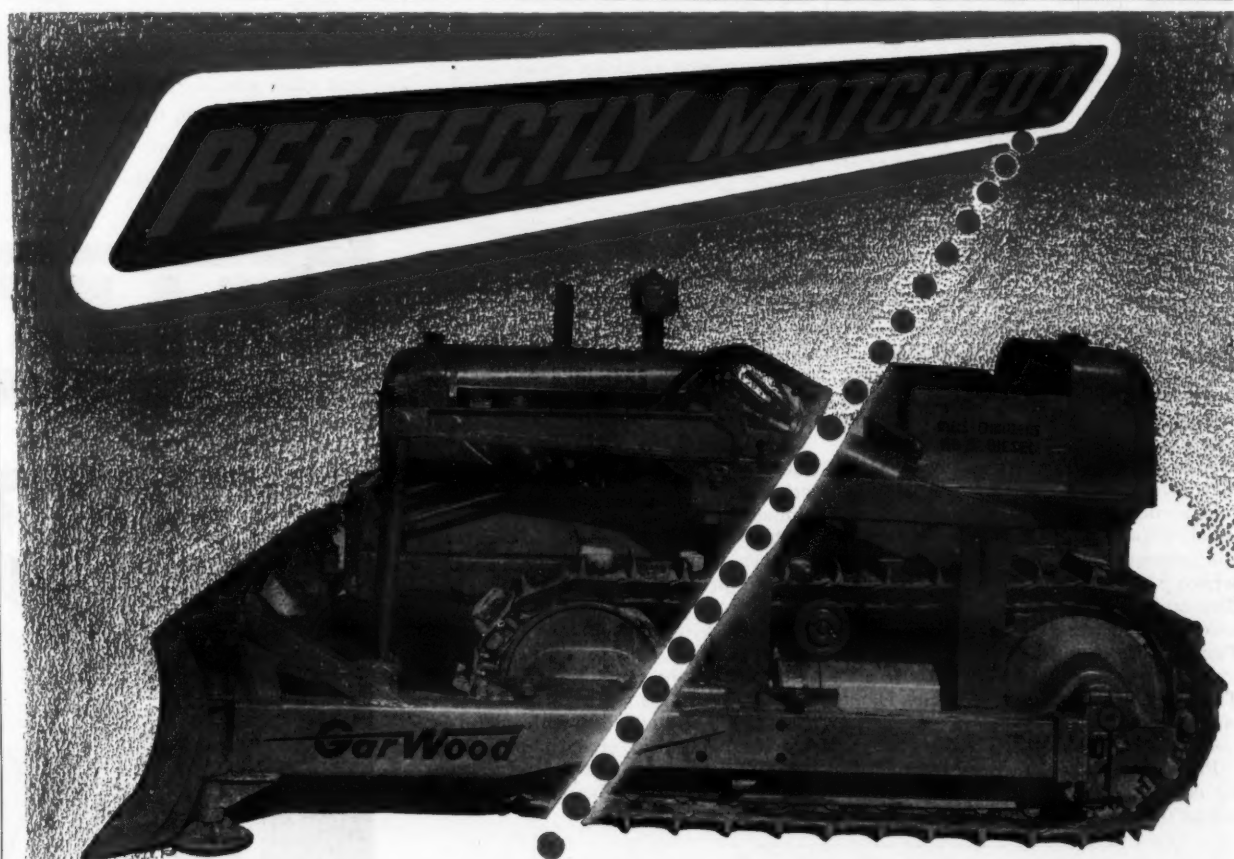


C. & E. M. Photo

An electric locomotive starts into Rams Horn Tunnel. Note the 20-inch duct from the Western blower; it supplied the men with fresh air and sucked explosion smoke away.

its limited headroom. The only hand shoveling that was necessary was a very little bit in connection with the laying of track sections ahead. After

the Conway mucker finished its digging, it retired to a siding back of the face and the drilling jumbo moved up (Concluded on next page)



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work. Perfectly-balanced earth-moving brawn that means more profit to you! And what's more . . . it's a combination that's built to take a beating . . . under the worst possible conditions . . . on the toughest jobs!

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Gar Wood quality and dependable operation when and where it counts. Then consider: this is newly designed, exactly-engineered, quality-built Gar Wood Equipment.

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ROAD MACHINERY DIVISION
WAYNE, MICHIGAN

Tunnels Blasted

(Continued from preceding page)

to start another round.

Incidental operations at this point included laying a new section of narrow-gauge track, and bringing the fresh-air duct and compressed-air line up closer to the drilling face. After the tunnel had been bored 4,000 feet into the mountain, a pressure surge tank was put in the compressed-air line. A rise of 7.62 feet from east to west portals was put in the 6,924-foot tube at an even slope of 0.0011.

Job Conditions, Progress

The feature of outstanding interest to tunnel men and contractors in the west was Rams Horn Tunnel's lack of spectacular problems. Rams Horn Mountain had proved to be solid gray granite as the geologists had predicted. There was not enough seep water to require unwatering pumps. The gray granite broke clean and true to project lines. It was a clean, sweet job.

Job progress stayed in line with the excellent tunneling conditions. Work started on April 27, and by the end of April, 98 feet was finished. At the end of May the tunnel had been advanced 1,143 feet through the mountain. By the end of June it was 2,213 feet in. A labor strike in July temporarily suspended operations, but by the end of that month, 2,950 feet had been drilled. At the end of August, 4,087 feet had been drilled, and the muckers were driving hard to hole through on the west portal by early November.

The work in Prospect Mountain Tunnel will present more of a problem, for already preliminary operations have uncovered a few spots of soft rock. One of the features of the Prospect Mountain structure will be the disposal of mucked material. It will be dumped by the railroad cars into a 400-ton hopper, where sliding gates will load trucks. The trucks will haul the broken rock below Government Village at Estes Park, where it will be used to raise the existing roadbed of Colorado Route 66. Then when the proposed Olympus Dam is built, the highway will be above the reservoir line.

Preparations had not been completed for concrete lining of Rams Horn Tunnel at the time it was visited. But un-

like the Continental Divide structure, which was so long the concrete had to be mixed inside, Rams Horn concrete will be mixed outside the east portal and hauled in to the Pumpcrete machine.

When the two tunnels are finished, Rams Horn will carry 550 cfs from the Alva B. Adams Tunnel to Marys Lake. The water will then be stored in the lake until evening, when peak energy loads will occur in the Estes Park power plant. Then the big gates at Marys Lake will open, releasing 1,300 cfs through the Prospect Mountain Tunnel and, ultimately, to the Estes powerhouse.

After the water has done its work, it will eventually reach the plains east of the Rockies and be used for irrigation. The Colorado River, America's great irrigation stream, will then pour a part of its stream east of the Continental Divide, contrary to anything Nature ever intended. It is an engineering masterpiece, and another link in the development of America's natural resources by the Department of the Interior.

Personnel

The project is being constructed in Region 7 of the Bureau of Reclamation, of which E. B. Debler is Regional Director. Walker R. Young is Chief Engineer of the Bureau. C. H. Howell is the Project Engineer, with F. K. Matejka as Construction Engineer, and D. E. Cannon as Office Engineer on Construction. The Lowdermilk firm is actively represented by George Foster, General Superintendent, who directs tunneling work in the field.

Metallizing-Process Book

The fourth edition of the Metco "Metallizing Handbook" contains the latest and most complete collection of technical and operating data on that company's process. In addition to up-to-the-minute data on preparation of surfaces, metallizing technique, and finishing procedure, many chapters contain information on corrosion resistance, specific gravity, hardness, bond strength, tensile strength, and relative shrink.

Put out by the Metallizing Engineering Co., Inc., this 86-page pocket-size handbook is illustrated with pictures, drawings, diagrams, charts, and graphs. It is available from the manufacturer, 38-14 30th St., Long Island City 1, N. Y., at a cost of \$2.00.

Universal Atlas Changes

The following changes in the staff of the Universal Atlas Cement Co., a subsidiary of United States Steel Corp., have been announced by T. E. O'Connor, Treasurer:

Alan B. Wells, Assistant Treasurer,


has retired after 46 years of service. Clarence A. Keeley, Assistant Treasurer, in addition to present duties will supervise credits for the metropolitan New York, Albany, Boston, and Philadelphia territories. The Credit Manager for these territories will be Robert A. Raggio.

MEMO

Re: SNOW REMOVAL

Looks like Haiss High Capacity Loading is the answer to our snow problem, too.

H.C.P.



The Haiss Model 75W Snow Loader digs . . . breaks-up and loads wet, dry or frozen snow at better than 10 yds. a minute. Clutches and gears in oil bath cannot freeze.

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"U.S." BUILDS THE RIGHT ELECTRIC PLANT FOR YOUR NEEDS!

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EASY OPERATION * The ROCKFORD Over-Center CLUTCH has a spring steel adjusting ring plate which yields slightly as the roller cams go over center thus relieving the back plate of strains. A spring-loaded effect holds the clutch firmly in engagement and distributes pressure evenly. Its hard surface and freedom to float practically eliminates wear. The adjusting ring is threaded for accurate, easy adjustment.

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POSITIVE ENGAGEMENT

LARGE DRIVING AREA

SMOOTH RUNNING

INFREQUENT ADJUSTMENT *

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Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
 314 Catherine Street, Rockford, Illinois, U.S.A.

Laboratory Is Watchdog For Highway Department

Exhaustive Examinations of Materials Used for Highway Construction Mean the Most For the Public Money

WATCHDOG for the Minnesota State Highway Department over all materials used in road and bridge building is the Materials and Research Laboratory. It is maintained by the Department on the University of Minnesota campus in Minneapolis. Here are carried on exhaustive examinations of all materials entering state highway projects. Moreover, an active research section determinedly pursues investigations of better methods of construction and better materials.

The Minnesota Highway Department's Laboratory had its beginning over a quarter of a century ago. At that time, the late Fred C. Lang, Professor of Highway Engineering at the University, was first called upon to act in an advisory capacity for the Department. For a few years, a small laboratory was set up in rented quarters off the campus. But in 1924 the Highway Department acquired space in the University's Experimental Engineering Building. The Laboratory became a permanent adjunct of the Highway Department, and Professor Lang, continuing his work at the University, also became Engineer of Materials and Research for the Department. He remained in this position until his death, which occurred a year ago.

Although the Laboratory is housed in the University Experimental Engineering Building, and although some equipment is used jointly by students and Highway Department personnel, there is no other tie-up. It functions independently under the direction of John Swanberg, Engineer of Materials and Research, and C. K. Preus, Assistant Engineer of Materials and Research.

The Laboratory now has more than 13,000 square feet of space available and employs as many as 85 engineers,

technicians, and others during peak activity periods. So tremendously has the scope of its work expanded, in fact, that the Laboratory has outgrown its house. There no longer is sufficient space in the University's building for the Laboratory's testing machines, its freezing room and ovens, its chemical laboratory, and numerous testing devices. The last State Legislature authorized construction of an addition to the Experimental Engineering Building for a State Highway Department Laboratory. As now planned, this new home for the Laboratory will provide some 24,000 square feet of floor space for

equipment and personnel.

The Laboratory of the State Highway Department is divided into two distinct sections: the Physical Section and the Chemical Section. In the former, tests are concerned primarily with soils, aggregates, cements, concrete, steel, and other materials. One of the chief functions of the Chemical Section is the examination of road oils, asphalts, tars, and bituminous mixes.

Aggregates and Soils

Very serious attention is being paid by the Laboratory to soils which form the subgrades of state highways, and to the sand and gravel used in base courses, wearing courses, and bituminous and concrete mixes.

One of the first tests given aggregate samples sent from the field to the Laboratory is for gradation. The sample is placed in the top sieve of a series of screens running down to a No. 4 (1/4-inch) sieve and the screens are placed on a vibrator. The material remaining on each sieve is weighed, and all ma-

terial passing the No. 4 sieve is again graded through a series of smaller sieves which scale down from a No. 10 to a No. 200, the last passing only dust or completely pulverized material.

To screen out material on which to make the Plasticity Index test, the Laboratory has built its own device which it calls its P. I. scrubber. This consists of a pair of screens and brushes, the upper one a No. 4 screen surmounted by a steel brush, the lower one a No. 32 stainless-steel screen surmounted by a nylon-bristle brush. The material is scrubbed through each screen by the brushes, which are rotated by a small electric motor. Since the P. I. test for cohesion is based only on the material which passes the No. 40 sieve, the mechanically operated scrubber saves a good amount of hand labor in getting the material through the last fine sieve.

Another test given gravel at the Laboratory is for shale content. State Highway specifications allow a maxi-

(Continued on next page)



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SHOVELS

The new Buckeye Shovel Catalog fully describes and illustrates all Buckeye shovels, trench hoes, cranes and crane attachments. Complete dimensions and specifications are detailed for every Buckeye machine. The many advantages of exclusive Vacuum Power Control are explained . . . the feature that has made Buckeye the outstanding shovel in its class. Designed as a reference guide, this new Buckeye catalog can be used to advantage when considering new equipment to meet your overall job demands. Write for your copy of the new Buckeye Catalog No. 846 today.

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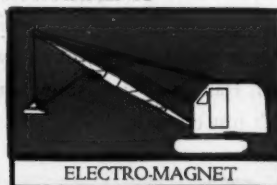
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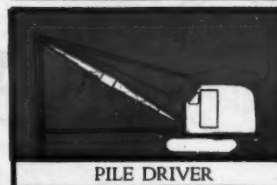
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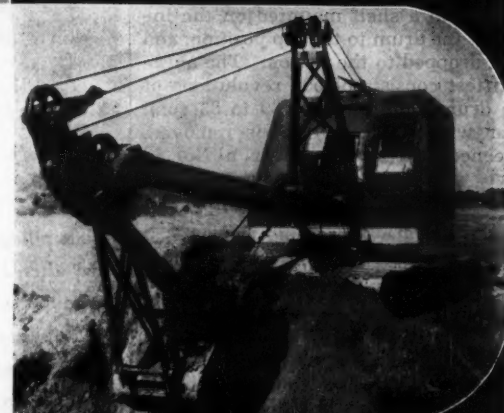
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"Lab" Is Watchdog

(Continued from preceding page)

imum shale content in gravel for bituminous and concrete paving, so gravel containing shale is sent to the Laboratory for analysis. The gravel is placed in a tank measuring about 1 x 2 feet and immersed in a solution of zinc chloride. The shale floats on the solution, is separated out, and the percentage of shale in the gravel is determined by weight.

Since gravel is often used for base course and soil is used for binder, moisture-density tests are run at the Laboratory to determine the optimum amount of water required to develop maximum density. Soils samples arriving at the Laboratory are placed in Despatch ovens and dried to determine the moisture content of the soil. When the clay content of soils is desired, the workmen in the Laboratory use a specially adapted malted-milk machine to mix water and soil.

Abrasion Test

Gravel and crushed rock are also tested at the Laboratory for quality, which is measured in part by their resistance to abrasion. Preliminary samples of ledge rock to be subjected to the abrasion test are crushed to 3/4-inch size in the miniature Cedarapids crusher in the Laboratory.

Using the Los Angeles abrasion test, the Laboratory technicians place materials in a revolving steel drum 20 inches long with an inside diameter of 28 inches. The gravel or crushed rock, together with an abrasive charge of steel balls 1 1/2 inches in diameter, are carried on a shelf mounted on the inside of the drum to the top position, and then dropped to the bottom. The abrasion test consists of 500 revolutions of the drum at a speed of 30 to 33 rpm, after which the material is removed, screened and washed over a No. 12 sieve, and weighed to determine the percentage of loss.

Bearing Tests

Tests for bearing values of subgrade and base materials are run in the Laboratory. However, the Laboratory has also begun to make field bearing tests on existing roads, using an Army-surplus 4 x 6 truck which has been equipped for road tests. The equipment, developed by the Laboratory for this research project, employs 6-inch and 12-inch plates and provides a maximum loading of 10,000 pounds. Through use of this equipment, the Laboratory hopes to develop a correlation between field and laboratory data as related to road performance under traffic.

Tests on Cement

Extensive tests are run on concrete cylinders and beams to determine strength and durability. But even before the pour is made on a construction project, the Laboratory has inquired into the properties of the cements being used. Cements are tested in several ways, but two of the most common tests are for setting time and for strength. In determining setting time, pats of cement and water are made on glass plates and the time of set determined with the Gillmore needle. The specifications require not less than 60 minutes for the initial set and not more than 10 hours for the final set.

Cement to be tested for strength is mixed with standard sand, molded into briquettes, and immersed in a controlled-temperature water bath at 70 degrees which provides storage under controlled conditions. The strength tests, which consist of pulling the briquettes apart, are made at 3 days, 7 days, and 28 days. AASHTO standard specifications are used at the Laboratory. With standard portland cement,

the strength requirement at 7 days is 275 pounds and at 28 days, 350 pounds.

Air-Entraining Cement

A recent development in cements is air-entraining. An air-entraining agent interground in the cement at the mill increases the durability of the concrete and its resistance to scaling and to the effects of freezing and thawing. The Laboratory makes a different kind of strength test on cement which contains an air-entraining agent. The air-entraining cement and standard sand are first made into 2 x 2-inch cubes. Then compression tests on the cubes are run with a hydraulic Baldwin-Southwark

Tate-Emercy testing machine which is capable of applying pressures up to 90,000 pounds. This hydraulic compression tester has considerably speeded up tests on air-entraining cement.

Cements are also tested for volume change as a measure of their soundness. Pencil beams of cement paste are made at the Laboratory. After 24 hours of moist curing, they are placed in an American Instrument Co. autoclave high-pressure steam cooker for 3 hours at 295 pounds of pressure per square inch. The pencil beams are measured before entering the autoclave and after removal and controlled cooling. The maximum allowable limit for expansion

is 0.5 per cent of length.

Resistance Tests

Concrete pavements in Minnesota are exposed to extremes of temperature and to the deteriorating effects of chemicals used on streets and highways during the winter months to remove ice. Two types of tests are made to determine the resistance of cements, aggregates, and concrete mixes to deterioration.

To determine resistance to scaling and deterioration caused by chemical action of calcium or sodium chloride, 6 x 6 x 1-inch segments of different mixes of cements and aggregate are

(Continued on next page)

YOU CAN BUILD THESE FROM 6 INCH SNOWS

Figure the depth of this, pushed up in banks

Start piling it up—a six inch snow today, three inches the day after, another six inches and so on. Then maybe you get a whopper and you've got banks you can't get rid of.

Handle the light snows with Snogo too. Either windrow it with blades and throw it into the fields or throw it directly from the road into the fields.

Snogo builds no banks into ever deepening narrow lanes that blow back on to the road surface and call for costly rehandling. Snogo throws the snow from 100 to 200 yards into the fields where it can do no harm. It can't build up drifts. Snogo cleared roads stay cleared until the next snowfall.

Snogo means open winter roads, safer winter roads. The kids get to school and back. Winter business holds up. The loss in perishables is cut and winter road damage is reduced. Handle all your snow with Snogo.

Remove it—don't just move it.

SNOGO

A SNOGO for EVERY BUDGET



KLAUER MANUFACTURING CO.
DUBUQUE, IOWA



C. & E. M. Photo
Shown in the testing machine section of the Minnesota State Highway Department Laboratory are John Swanberg, Engineer of Materials and Research (left), and C. C. Hansen, engineer engaged in base investigations.

"Lab" Is Watchdog

(Continued from preceding page)

mounted on wheels, each carrying 16 segments. The wheels are turned by an electric motor with a gear reducer, revolving at the rate of about three turns every 24 hours. The concrete segments are immersed in a solution of calcium chloride or salt at the rate of three times a day, and are inspected for signs of scaling or breakdown.

Deterioration of concrete as a result of freezing and thawing, however, is not always visible. The Laboratory runs a thorough test of concrete mixes to determine interior breakdown as a result of these factors.

Beams are frozen in the Laboratory cold room at 10 degrees below zero, then thawed in a 40-degree bath. Between the alternate thawing and freezing cycles, the beams are tested to determine any change in sonic modulus of elasticity. This is done by measuring the natural frequency of vibration of the beams. This frequency is a function of the dimensions of a beam and its modulus of elasticity. The natural frequency is determined by applying a varying frequency and measuring the amplitude of vibration by means of a cathode ray oscillograph. The frequency of maximum amplitude is the natural frequency. As a beam deteriorates, a steady decrease in sonic modulus of elasticity is observed.

The freezing and thawing cycle is used in the Physical Section of the Laboratory to test another type of material. Joint compounds composed of a mixture of asphalt and rubber are given an extension test during five cycles of freezing and thawing. A 1-inch joint between two sections of concrete must adhere to the concrete for a 1/2-inch extension during each of the five cycles.

Concrete Cylinders

The concrete which is poured on a Minnesota highway or bridge is given a thorough series of tests for strength and for conformity to specifications. At the time of pour on a job, cylinders 6 inches in diameter and 12 inches high are poured in fiber forms and sent to the Laboratory. These cylinders are placed in the moist-air room, and at the age of 28 days are subjected to compressive strength tests.

The Laboratory is well equipped for almost any type of strength test on any material. Tinius Olsen, Riehlé, and Baldwin-Southwark testing machines at the Laboratory include two 50,000-pound, one 90,000, one 100,000, one 200,000, and one 400,000-pound compression and tension machines.

After the construction season has ended, a core-drilling machine goes out over the new concrete state highways,

taking cores 6 inches in diameter for the full thickness of the slab. These are examined for conformity to specifications as to thickness and are subjected to the compressive strength test.

Steel, Too

But not all tests made by the Laboratory are concerned with soils, aggregates, and concrete. Steel, even down to signs and posts, must stand up to the rigid requirements of the State Highway Department. Certain types of steel such as reinforcing bars are tested for tensile strength and are subjected to a bend test. This steel must take the bend test without fracturing or cracking. Steel posts are subjected to a loading test to determine their strength characteristics.

Chemical Laboratory

While the Physical Section of the Laboratory is concerned with the physical properties of road and bridge-building materials, the Chemical Section just as minutely scrutinizes the

chemical properties of the materials entering state roads. Its work covers many materials, from chemical analysis of steel used for corrugated culverts to gum tests of gasoline and resistance tests of paints. But most of its work is on bituminous materials. During the bituminous-construction season in Minnesota, generally extending from June 1 to November 1, tests are made on upwards of 2,000 samples of asphalts, tars, cut-backs, oils, bituminous mixes, and joint fillers.

Among the tests made on bituminous materials are tests for ductility, viscosity, penetration, residue, flash point, and solubility. The materials are tested for purity and composition, and samples of every car of oil, asphalt, or tar shipped to the state must be approved by the Chemical Section. All tests are carried on at standard temperatures and under controlled conditions.

Not only are tests made of materials being used on maintenance and construction projects; samples are also taken of old mixes, the asphalt is re-

covered, and the asphalt and aggregate are analyzed. This inspection of old mixes often provides clues to the best type of mix to be used at certain locations or under specific conditions.

Research

Research goes hand in glove with testing and inspection at the Laboratory of the Minnesota State Highway Department. It is sometimes difficult to determine where the one ends and the other begins. The development of the 4 x 6 truck for highway bearing tests was a research activity that is being put to practical use by the Physical Section. Investigations of cements for strength and durability are carried on jointly as research and routine testing activities.

The research part of the work of the Laboratory has inquired into soil properties and has examined the performance of flexible-type pavements. One of the joint fillers now in use throughout the state came as a result of

(Concluded on next page)

Meet

WHO IS HE?

When a business succeeds, it usually grows. This growth calls for a more complex system of management and, often, more widespread ownership.

Take a company like Allis-Chalmers, which has grown and progressed for 100 years. Just who is Mr. A-C? Because the answer to a question like that is complex, it is easy for people to pick up mistaken impressions.

For the sake of the record, let's take Mr. A-C apart and see who he really is.

WHO IS CAPITAL?

Capital doesn't wear a silk hat at Allis-Chalmers. "Capital" consists of 23,100 stockholders who own an average of less than 110 shares each. Mr. Capital might be a grocer, a farmer, a widow, a school teacher, or YOU. He might be a company employee in the office or shop or an officer of the company.

No one individual or family owns more than 1/2 of 1 percent of the total stock of Allis-Chalmers. This is an example of democratic ownership distinctive in the history of large corporations.

WHO IS MANAGEMENT?

Management is the guiding hand (or head) hired by the owners to make an organization tick — and click! Management coordinates the efforts of individuals and sets the direction the company travels.

Who is Mr. Management at Allis-Chalmers? Not just the officers and division heads of the company. Management is the salesman in the territory, the foreman in the shop.

Management is every employee from errand boy to president who contributes by word and deed to the progress of the company.

Speaking of errand boys, two of the top officers of Allis-Chalmers started with that job. Two others started as salesmen in the field. Two others as student engineers. All Allis-Chalmers officers know the business from the ground up — through experience with the company.

Mr. Management doesn't wear a high wing collar at Allis-Chalmers. Neither does he have any monopoly on his job.

WHO IS LABOR?

The man who works in the shop is spoken of in the newspaper as "labor." Actually, he may be a skilled craftsman, as much a master of his trade as a dentist or a surgeon.

Actually he may be a part of *Management* by reason of some suggestion he has made to improve a process or a product.

Actually he may be a part of *Capital* through ownership of company stock.

The fact that he works with his hands makes him no less a part of Allis-Chalmers than the man or woman who works at a desk. The terms "Capital," "Management," and "Labor" are indefinite and overlapping. Many a man who works in the shop is actually a part of all three groups.

Introducing Mr. A-C

Who then is Mr. A-C? He is a combination of 23,100 stockholders, 25,000 employees, nearly 5,000 dealers and their employees, and more than 10,000 suppliers who furnish in excess of 100,000 separate items for manufacture.

He symbolizes a company in which no individual or family owns more than 1/2 of 1 percent of total stock.

His is a company which contributes something to better living in nearly every home in America — in supplying machines to grow and process food, generate electricity, pump water, build roads, produce building materials.

Quite somebody, Mr. A-C! A potent contributor to the welfare and livelihood of millions of people. It takes the right hand, left hand, head, heart and pocketbook to achieve such results. No one part of him can do the job alone.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U.S.A.
2-CYCLE DIESEL CRAWLER TRACTORS • MOTOR GRADERS
POWER UNITS • INDUSTRIAL WHEEL TRACTORS

"Lab" Is Watchdog

(Continued from preceding page)

Laboratory research. It was discovered that for Minnesota's severe winters and sometimes extremely hot summers, better performance was obtained with filler composed of 20 per cent diatomaceous earth and 80 per cent asphalt; this specification has been followed with good results.

Personnel

The Laboratory of the Minnesota State Highway Department has contributed materially to the rapid advancement the state has made in highway construction. Not only has it safeguarded public funds by its determination that materials and methods of their use meet specifications, but through its research it often has pointed the way to better materials and methods.

The Laboratory is under the direction of John Swanberg, Engineer of Materials and Research, and C. K. Preus, Assistant Engineer of Materials and Research. M. A. Peterson is Chief Chemist, W. L. Hindermann is Bituminous Engineer, and G. A. McPherson is Laboratory Chief. C. C. Hansen is engaged in base investigations for the Laboratory, and T. W. Thomas pursues research studies. S. S. Watkins, Soils Engineer, and C. J. White, Concrete Engineer, are stationed at the main office in St. Paul for closer liaison with the Design and Construction Divisions.

Colored-Line Prints Reproduce Drawings

A wide variety of prints for general and special needs is offered by the Charles Bruning Co., Inc. All these BW prints are direct-line positive prints, made from transparent or translucent originals and ready for use in seconds, the manufacturer says.

Medium-weight BW prints, with their black lines on white backgrounds, are designed to serve as all-purpose, easy-to-read, easy-to-check prints for reproducing engineering drawings, typed copy, forms, etc. For shop use, as well as for charts, maps, and displays, they can be produced on card-weight paper. For convenience in filing or mailing, they can be made on lightweight paper.

To distinguish prints used by different departments, light, medium, or card-weight prints can be produced with brown or red lines on a white background. No specially sensitized BW stock is needed. When still further differentiation is required, the prints can be produced on green-tinted backgrounds with black, brown, or red lines.

To safeguard original tracings, the system offers transparent prints, thin-paper duplicates of original tracings. All types of BW prints can be produced from these intermediates. Another Bruning intermediate is BW film, a matte-finish transparent acetate safety film. It can be used to safeguard original tracings and to salvage worn or soiled tracings. Weak lines of original tracings are said to be intensified on the film, and subsequent prints produced from it are clear and sharp, according to the Bruning Co.

All these BW mediums can be produced on the new Bruning combination Model 41, which consists of the Model 40 printer and the 158 developer. With an actual printing and developing width of 46 inches, the Model 41 exposes BW black and white prints from roll stock or cut sheets. Printing-speed is controlled by a single hand-operated knob and an easily read dial. A foot-pedal control at floor level instantly releases the tension on contact bands, enabling the operator to correct misfeeding of roll stock. The developer has a new-

type ironing roll which produces flat dry prints ready for use.

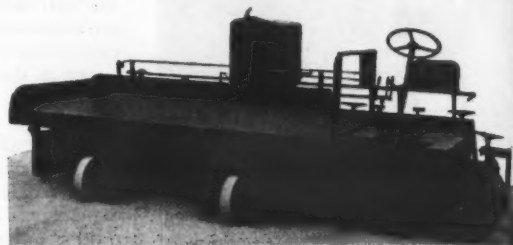
Complete details and information can be obtained directly from the company by reference to this news item. The address is: 4754-14 Montrose Ave., Chicago 41, Ill.

Taglines Steady Buckets

Taglines designed to eliminate swinging of buckets are described in a 24-page catalog issued by the McCaffrey-Ruddock Tagline Corp. Rud-o-Matic taglines and magnet reels function on a spring principle; it is claimed that they maintain at all times a positive tension sufficient to steady a clamshell bucket under any conditions, and that they will operate efficiently with the boom at any angle.

Installation directions are presented in the catalog in a concise and easy-to-understand manner; specifications are included. Copies are obtainable by writing to the manufacturer at 2121 E. 25th St., Los Angeles 11, Calif.

*For Faster,
Easier
Road
Widening*



Use APSCO Model 70

- Road widening jobs now move as fast in tonnage as full width paving.
- Widening range from two to six feet—can be increased to eight feet with extra attachment.
- Handles all 1½" and down materials from bituminous mix to stone and gravel.
- Seven speeds forward, two reverse.
- Two engines, dual rear driving axles, mounted on pneumatic tires.
- Write Today For Descriptive Folder.

The All-Purpose Spreader Company, Elyria, Ohio



His Sense Saved My Dollars!

Talk about a money-saving idea, this one that my Oliver "Cletrac" dealer suggested really takes a prize! We were doing the dirt moving on this ground-leveling job, and what with high costs and weather troubles, were getting a little worried about both time and money.

Our Oliver "Cletrac" man came out to look over the job one day, and I did a little high-class beefing about the whole thing. Then he popped this one. "Why not build a sunken loading platform to load out the trucks?" he asked. "Then your tractor-scraper unit can haul the dirt up on the platform and dump it through an opening into the truck body. You'll eliminate a shovel and save a lot of time that way, and time is money these days."

It was a darn good idea—one we just had overlooked. We went to work on it right away and believe me, it really saved our hides. That Oliver "Cletrac" man sure knows the dirt-moving business and he's a good man to know!

Cletrac

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The OLIVER Corporation

OLIVER
Cletrac
SALES
SERVICE

"THE SIGN OF EXTRA SERVICE"

Crest Is Raised On Fort Peck Dam

**Tractor Equipment Lifts
Crest Height of Big Dam
By 7 Feet; Riprap Raised
With New Silt Fill**

THE first dam in the series to control the Missouri Valley Basin is being topped off. By December, Northwestern Engineering Co. of Rapid City, S. Dak., had finished the raising of the elevation of the main dam and dike section at Fort Peck, Mont., a maximum of 7 feet in height. It is also constructing a highway from the east abutment of the dam to the spillway and stockpiling bituminous road-paving materials. The total contract, amounting to \$800,000, is being supervised by the Fort Peck District Office, Army Engineers.

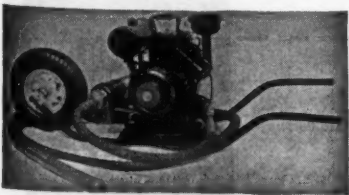
The final large earth job at Fort Peck involves excavation of 600,000 cubic yards of earth and shale to build the roadway from the dam to the spillway; 156,000 cubic yards of sand-silt embankment excavation for the top of the dam; and 85,000 cubic yards of glacial-till borrow excavation also to be placed on the 45-foot crest of the earth-fill barrier. Other phases of the Northwestern contract involve the placement of about 23,000 square yards of derrick-stone riprap on the upstream face, and the installation of night-lighting.

Work under the recent contract was necessary to regain the elevation loss by settlement of clay strata under the 126,000,000-cubic-yard hydraulic fill. The tremendous weight of this earth mass has literally squeezed the water out of substructure clay, and the dam has settled about 5½ feet. Careful studies made since 1940 have entered into this contract, and Lieut. Col. H. H. Roberts, the Army District Engineer, believes a 7-foot elevation increase will take care of all ultimate settling. Less than 7 feet is necessary in many places, and where the dam meets the shallow dike section the fill is negligible.

Earth Work

The earth work was sublet to H. F. Emme Construction Co. of Rapid City, S. Dak. This firm moved in a fleet of tractor equipment especially designed to cope with heavy sand-silt and gumbo shale, with long hauls, short hauls, and steep grades up the side of the dam.

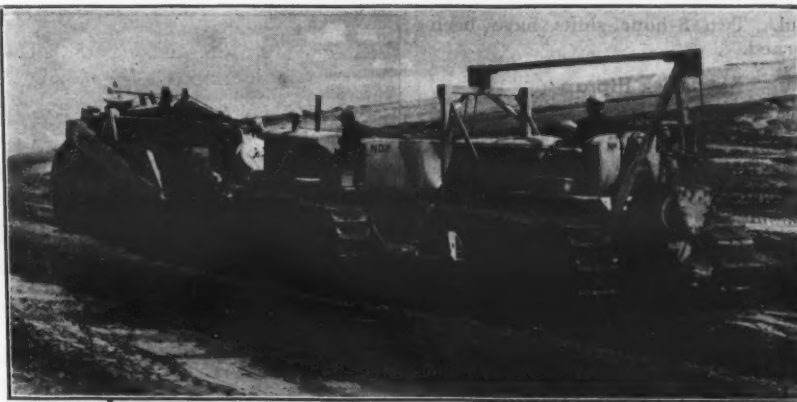
Three Wooldridge Terra-Cobras were brought in for the long-haul work on the spillway road. Five LeTourneau and LaPlant-Choate scrapers from 12 to 18-cubic-yard capacity, were brought in with D8 Caterpillars for prime movers. Two Caterpillar D8's and a D7 with LeTourneau push-blocks were designated as pushers. A Caterpillar D7 with a LeTourneau bulldozer blade was planned for rough borrow-pit grading. A Model K-30 LeTourneau roter with two teeth, two Caterpillar No. 12 motor graders, 3 pneumatic rollers, 2 sheep-foot rollers, and 3 gravity-type water trucks with 1,400-gallon tanks complete the equipment picture.



Complete line of
gasoline, pneumatic and electric driven
concrete vibrators and grinders
Write for information and prices

ROETH VIBRATOR COMPANY

1727 Farragut Ave. Chicago, Ill.



C. & E. M. Photo

Two Caterpillar D8's get behind this Terra-Cobra to insure a capacity load. H. F. Emme Construction Co. held a subcontract for the recent earth work at Fort Peck Dam.

The right abutment of the dam is composed of Bearpaw shale. A heavy cut was necessary here for the spillway access road. With a ripper working ahead of them, the Terra-Cobras moved in on this formation. It was handled successfully. Emme even dispensed

with the ripper towards the last. With the use of pusher tractors, the Cobras picked up full loads, which they wasted in a deep coulee according to U. S. Engineer Department plan. This fill was later dressed for use as a Government storage yard.

The access highway from the dam to the spillway is 2½ miles long, with a considerable number of fills. Cuts with better material than the shale were used for top lifts of the fill sections for finishing.

When dredges were pumping the fill, it was estimated that the dam would settle. So a big deposit of Missouri River silt and sand was left on the downstream slope of the main dam to allow for this. Emme's equipment moved this material off the slope and the toe and placed it on top of the 2-mile dam. When he could, he loaded downhill on the slope, and hauled up to the crest over an access ramp. The tractors and scrapers dug out a ramp when the excavation around it was finished, and moved to the next one. It was generally possible to keep the slope grade finished by back-blading with a Caterpillar D7-mounted bulldozer blade, although the scrapers sometimes graded as they went downhill.

The Terra-Cobras moved in to the
(Concluded on next page)

PUMPING OVER 1,500,000 GALLONS OF WATER DAILY!



This Chrysler Industrial 7 engine
pumps over 1,500,000 gallons of
water daily for a large Texas farm.

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With their high compression, flexible horsepower characteristics, these engines are compact and portable because of low weight per horsepower. Simplicity of design makes them readily accessible.

These features plus Chrysler Superfinishing of moving parts assure a smooth, economical and dependable flow of power for the farm and many types of industrial application.

Send coupon for the Industrial Engine catalog giving complete information on engines and power units.

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C. & E. M. Photo
A crane unloads derick stone to bring riprap work on the upstream face of Fort Peck Dam even with the spillway access road. In the left foreground, A. J. Bussman, Project Manager for the Northwestern Engineering Co., confers with two Government inspectors.

Fort Peck Dam

(Continued from preceding page)

dam fill when they finished the initial work on the spillway road. These machines were used generally to pick up heavy material at the toe of the downstream slope and haul it to the crest; the longest hauls were picked for them. When sun or wind dries Missouri River silt, Emme found, it is extremely difficult to load to capacity. It gets fine, and it's heavy, so it sifts out. It was sometimes necessary to use two pushers behind a Terra-Cobra in order to insure a capacity load, but so far Emme has not found it necessary to sprinkle the borrow pit. He will do so if the pit gets dry enough to justify it.

The scrapers hauled about 1,000 feet under average conditions. On an average day, the day before the project was visited by CONTRACTORS AND ENGINEERS MONTHLY, four scrapers moved 2,500 cubic yards. Terra-Cobras moved about 300 cubic yards apiece on a 1½-mile

haul. Two 8-hour shifts have been worked.

Rock Riprap

The Northwestern Engineering Co. has rehandled 23,000 square yards of rock riprap in pieces from 4 to 16 tons, to bring the riprap work on the upstream slope even with the finished roadway. Most of this rock was stockpiled when the dam was built, after having been quarried near Harlem, Mont.

The top slope line was placed to line and grade as established by a string. Three FWD 10-ton dump trucks were loaded at the stockpile by a 1½-cubic-yard Osgood crane. After a ¾-mile trip, they were unloaded by a Koehring 701 crane and a Northwest 15-ton crane. The rock was accurately handled by the use of chain slings with shackles and deformed lifting pins. Almost every rock had drill holes placed at the quarry. The steel pins had a deformed knuckle in the center of the shank, so that when a strain was taken on the pin the knuckle pressed against the inside of the hole with enough force to lift the rock. The two lifting pins were fastened to the chain sling by shackles. If a rock showed up without holes, it was lifted with the chain rigged as a sling.

The riprap blanket varies in thickness from 2 to 4 feet, and operations have proceeded at an average rate of 150 square yards per 16-hour shift.

Highway Blanket

A 9-inch base course of selected gravel will be placed on top of the dam and the spillway road when the embankment is finally finished. The S. S. Roberts Construction Co., also of Rapid City, has a subcontract to crush and stockpile 116,000 tons of bituminous and base-course aggregate for future work. Northwestern Engineering Co. will crush and place on top of the dam and spillway road approximately 65,000 tons of aggregate for base course and stockpile 17,000 tons of shoulder course and chips.

Personnel

Lieut. Col. H. H. Roberts is the Fort Peck District Engineer supervising the job, with T. L. Ashton as Resident Engineer. H. H. Nicholson is Chief of the Construction Division. For Northwestern Engineering Co., A. J. Bussman is the Project Manager; R. J. McCain and



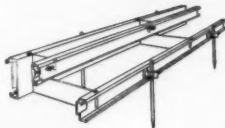
C. & E. M. Photo
A Caterpillar D7-mounted bulldozer back-blades the downstream slope grade of Fort Peck Dam to final section. A sand-silt deposit was left on the slope when the dam was built to allow for future crest-lifting after settlement.

O. B. Callan are Superintendents; W. L. Thompson is Field Clerk. H. F. Emme is supervising all earth work, assisted

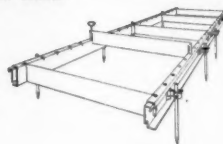
by M. F. Fuller, Superintendent. I. F. Hilton is Office Manager for the H. F. Emme Co.

STEEL FORMS

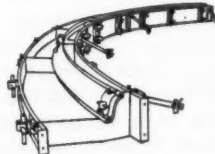
Curb Forms... Sections 10' long for either straight face or battered face construction. Steel forms for all special concrete curbs.



Combined Curb and Gutter Forms... Each 10' section consists of 1 each of back curb form, front gutter form and face curb form, also 2 each of face curb form supports, round stakes for back form and round stakes for gutter form.



Sidewalk Forms... 10' sections, slotted 12" for division plates, which are removed without disturbing side forms after concrete takes its initial set.



Rigid Radius Forms... Used for building concrete curbs or curb and gutters when all intersections or corners must match. Heltzel forms made in sets to form a specified radius.



Flexible Forms... Used when building radius curbs, curb and gutters or sidewalks where the radius is subject to frequent change or for serpentine work in park areas.

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Snow-Free Roads Cut Traffic Accident Toll

In spite of the fact that there are few new cars on the highways, automobile traffic has increased 10 per cent over its pre-war high, according to Lloyd Reid, traffic engineer of Detroit. It is still going up. With such a rapid increase, traffic accidents will also hit an all-time high during the coming months unless drivers and highway officials alike take extra precautions, Mr. Reid declared.

He spoke before a highway safety meeting called by the International Salt Co., Inc., to complete plans for increasing road safety this winter. Mr. Reid pointed out that fatal car accidents always show a sharp rise during the snow and ice season. Because the current winter months will be even more dangerous than usual in view of the steady increase in traffic, he urged public officials to make certain that adequate supplies of rock salt and snow-removal equipment are on hand to keep highways free of snow and ice. The

only safe road is a snow-free road, he added; and, with modern techniques available, there is no reason why every road should not be a safe road every day in the winter.

Most of the nation's heavy traffic is concentrated in the states east of the Mississippi and north of Kentucky, Mr. Reid said. Since that is the area where severe winter driving conditions exist from November to March, drivers and public officials alike in that area will need to be especially careful to hold down the accident toll.

New 1-Hp Engine

A lightweight, compact, gasoline engine has been developed by Power Products Corp. of Grafton, Wis. The engine weighs 16 pounds and will develop $\frac{3}{4}$ to 1 hp. It is $8\frac{1}{2}$ x 11 x 14 inches.

Designed for portable pumps, compressors, lighting systems, etc., it is a single-cylinder 2-cycle air-cooled engine. It is all-aluminum and has a gas-

tank capacity of 0.4 gallon, which is said to be sufficient for 3 hours of operation. A minimum of vibration and noise is said to characterize its performance.

Write to the manufacturer for further information.

New Asst. Sales Manager

K. V. (Ken) Turner has been appointed Assistant Sales Manager of LaPlant-Choate Mfg. Co., Inc., of Cedar Rapids, Iowa, according to a recent announcement.

Mr. Turner started work for LaPlant-Choate as a blueprint clerk in the Engineering Department in 1938. Since then his experience with the company has been diversified, including service work, export sales, Government sales, field engineering research, and work as a district sales representative in north-eastern United States.

Last year he was called back to the Cedar Rapids office to assist in organizing LaPlant-Choate's independent-dealer program.



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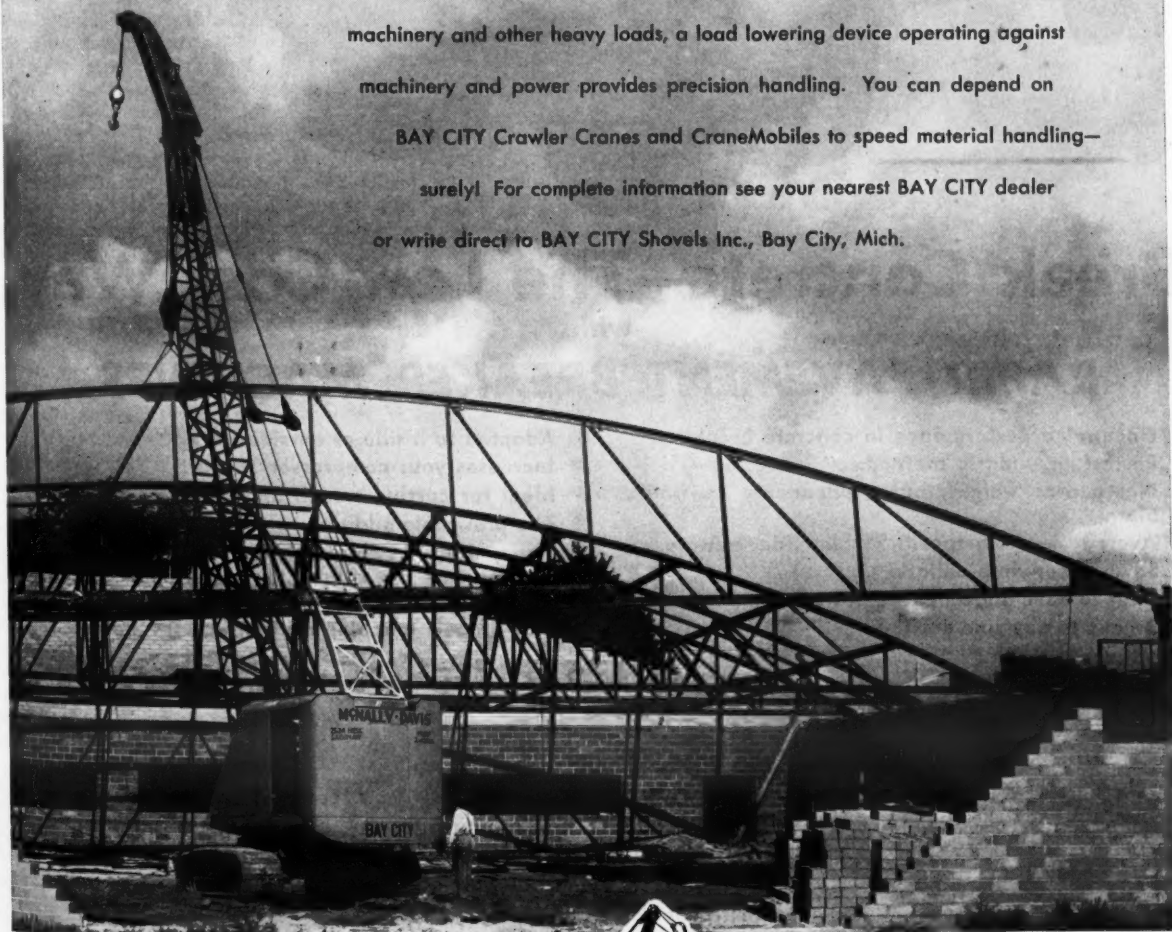
machinery and other heavy loads, a load lowering device operating against

machinery and power provides precision handling. You can depend on

BAY CITY Crawler Cranes and CraneMobiles to speed material handling—

surely! For complete information see your nearest BAY CITY dealer

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Modernizing country roads involves considerable widening and relocation. Here an Allis-Chalmers HD-7 diesel tractor-doser forces nature to give a little on a road-improvement project.

Protection Against Rust and Corrosion

A cathodic-rectifier unit to provide rust and corrosion protection for steel water tanks and deep well pumps has been announced by the Trimount Instrument Co., 37 W. Van Buren St., Chicago 5, Ill.

This unit is said to stop rust and corrosion by eliminating the electrolytic action on the metal being protected. Ordinarily, a steel tank or pump acts as a galvanic battery; the submerged part forms the anode, which is subject to rapid rusting, pitting, or corrosion. With a cathodic rectifier, the flow of current in the tank or pump is reversed by introducing a cathode which is charged by the rectifier. The metal of the tank or pump thereby becomes the cathode and is not subject to corrosion or rust.

The unit is contained in a weather-proof steel cabinet and has a dc output capacity of 2 to 5 amperes at 31 to 50 volts (100 to 150 dc watts); this is sufficient, the manufacturer says, to protect submerged areas up to 10,000 square feet. Preferred ac input is 110-volt 3-phase 60-cycle, but the unit can be equipped to take other ac characteristics. For further data, write to the manufacturer.

ASA Holds Convention

"The proper development and use of standards is the most effective tool now available to management for controlling costs in this period of rising labor and raw-material prices", according to Howard Coonley, Chairman of the Executive Committee of the American Standards Association. He made this statement on announcing the 28th annual meeting of the Association at the Waldorf-Astoria during November of 1946.

The need for standardization in all fields was pointed out by the speakers at the 2-day convention. They also stressed standardization not as an anchor upon the manufacturer and a restriction on industry, but as a means by which all people will gain.

Executives of the ASA discussed the progress which has been made since the end of the war in converting wartime standards to fit a peacetime economy. New committees were announced and the fields they are to cover were outlined.

Frederick R. Lack, Vice President of Western Electric Co., will be President of the organization for the current year. He will be assisted by George H. Taber, Jr., as Vice President.

Highway-Lighting Booklet

At the President's Highway Safety Conference held in Washington, D. C., last March, it was pointed out that though less than a third of total traffic is at night, about 65 per cent of the traffic fatalities and 48 per cent of all traffic highway accidents occur during darkness. Listed high among nighttime hazards was poor visibility.

In many instances, it was pointed out, existing lighting systems can be modernized at relatively small conversion costs by the use of fixtures that more efficiently direct the light onto the pavement. In this way, as well as by the installation of entirely new equipment, satisfactory lighting which approaches or equals standards recommended by the Illumination Engineering Society can be obtained. The cost of street and highway lighting, where conditions indicate the need, can often be justified by reduced economic loss, and lower insurance rates.

Recently a booklet of text and charts was prepared on the subject of traffic safety lighting and its ultimate economy by A. F. Dickerson, Manager of General Electric's Lighting Division at Schenectady 5, N. Y. In it he presents statistics on street and highway lighting and his views on how to plan and pay for it.

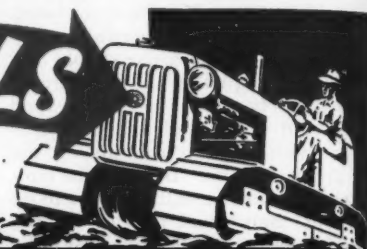
To obtain the booklet, write to General Electric and mention this item, requesting bulletin No. GES-3341.

Purdue Road School Plans

Plans have begun to take shape for the 33rd Annual Purdue Road School to be held on the campus at Lafayette, Ind., February 3 to 6, 1947. The dates selected have placed the Road School between university semesters so that congestion will be at a minimum, and housing facilities will be more readily available.

The University is faced with the problem of obtaining rooms for all who want to attend, and every step is being taken to that end. But it requests that those who can make reservations at hotels in the various cities near Lafayette.

The Road Show, usually held in conjunction with the School, will not be held in 1947 because of lack of space, due to Student registration.



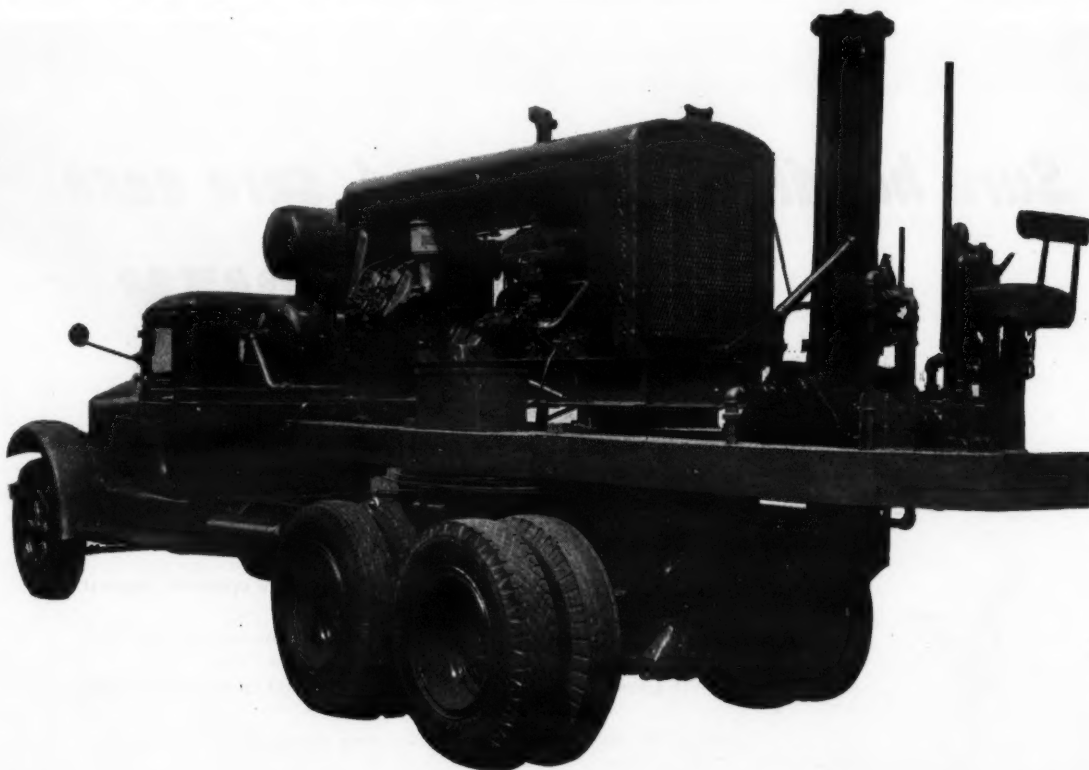
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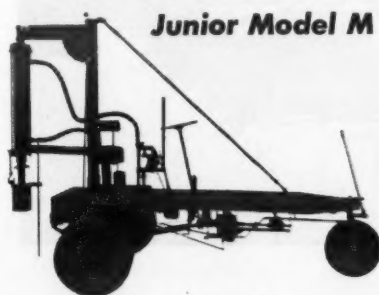
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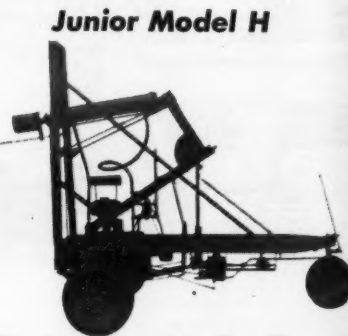
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"We never have trouble with the men forgetting their helmets anymore."

New Instruments Aid In Subsurface Study

The work of the Soils Bureau of the New York State Department of Public Works will be facilitated by two units of scientific equipment for use in subsurface investigations of highway and building location. The units to be acquired are a Shepard-type portable seismograph and a Gish-Rooney portable electrical resistivity apparatus. They will be used to supplement the core-drilling and soil-sampling methods of physical analysis now in use.

The seismograph consists of a portable control unit, detonator, and three detectors. In use, the detonator and detectors are set up, in line, at measured distances and connected to the control unit. A small explosive charge is set off in the detonator and, at the same instant, a tuning fork is struck in the control unit. The initial sound wave from the explosion travels down through the soil to any hard stratum that may underlie it. It is carried horizontally over the hard stratum and bounced upward to actuate sensitive recording instruments in the detectors.

These impulses are carried to the control unit from the detectors, by electrical impulse; there they are recorded upon a moving film strip. The readings are interpreted and plotted on a map which reveals the desired information to the geophysicist and engineer. The seismograph will yield satisfactory results to depths of nearly 200 feet and through several intervening strata of different materials. It is particularly useful in locating and charting rock and other hard formations.

The electrical resistivity apparatus will be used principally to chart the locations, type, and depth of clays, silts, and gravel. With this equipment, the known variable electrical conductivity of different soil materials is used to chart underground conditions by interpretation of potential changes between electrode rods driven in the surface at fixed distances apart.

In use, four rods are driven a short distance into the ground, on a straight line. An electrical current is applied to the outer rods and readings made of the drop in potential between the outer and inner electrode rods. Readings are made directly from the control unit and recorded. Each test is made with a different distance between electrodes. The equipment is readily portable and readings can be made quickly.

It is felt by the Soils Bureau that additional use can be made of the equipment to help locate and plot the size and location of buried deposits of sand and gravel for use as concrete aggregates.

Gar Wood Staff News

Clifford A. Sharpe has been elected Vice President in charge of manufacturing of Gar Wood Industries, Inc., it was announced by John J. Bergen, Chairman of the Board.

Mr. Sharpe will supervise Gar Wood's manufacturing operations in Detroit, Wayne, and Marysville, Mich.; Mattoon,

Ill.; Findlay, Ohio; Newport News, Va.; and St. Paul, Minn.

Russell D. Hiller, Jr., has been named District Manager in the states of Texas, Oklahoma, and Louisiana, with headquarters in Tulsa. Prior to joining Gar Wood, Mr. Hiller was with Air Reduction Sales Co. in Tulsa.

Texas Relocates Houses

Displaced by Expressway

Texas highway authorities have run into this problem: what to do with houses located on the proposed right-of-way for a section of Interstate Highway U. S. 87, in Bexar County. In order that a minimum of housing facilities be destroyed, the Planning Board of San Antonio and Bexar County has arranged the purchase of a 15-acre tract of land.

The tract has been subdivided into suitable lots. After considerable preliminary filling of this low area, paved streets are to be provided and public utilities installed. Then the entire tract

is to be made available only to those home owners displaced by the expressway project. All homes within the proposed right-of-way that can be moved will be re-established on these new home sites. And where it is practical, those houses that cannot be moved in-

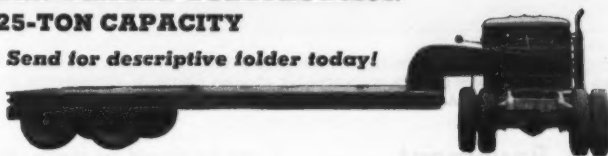
tact will be torn down and rebuilt on the new sites.

Texas highway authorities believe that, in this manner, less than 10 per cent of the homes now within the proposed right-of-way will be destroyed. The benefits of such a plan are obvious.

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Authenticated News Photo

Modern U. S. road-building methods and equipment are doing much for the roads of Central America. Here a Buckeye spreader applies chips on bituminous treatment on a section of Inter-American Highway 6 miles south of Carthage, Costa Rica.

Airport Pavement Design Discussed

A pavement-design method developed by the California State Division of Highways in the late 1930's was discussed at the American Society of Civil Engineers' fall meeting in Kansas City, Mo. Those attending were told how it helped the Corps of Engineers to speed construction of airports which had to be built rapidly and safely on all types of soils, to withstand unprecedented air traffic as the war's tempo increased.

W. J. Turnbull, who heads the Soils Division, U. S. Waterways Experiment Station, Vicksburg, Miss., was the speaker. He addressed the initial meeting of the Society's recently organized Air Transport Division; it was one of eight technical groups which held sessions during the meeting. Mr. Turnbull called the resultant airport pavements "permanent and satisfactory for capacity operation, which is defined as the maximum traffic that can possibly operate at a field for a period of 20 years".

The California bearing ratio method, Mr. Turnbull said, is a subject of considerable controversy among engineers. It is largely empirical, while engineers prefer more "rational" methods. But "the Corps of Engineers, after considering several currently used design methods, early in 1942 adopted the empirical method for reasons which were considered sound".

He described the California method as follows: "It consists of forcing a 3-square-inch circular piston into the soil and measuring the resistance to penetration. The resistance is converted to a bearing ratio by comparing it with the resistance obtained in penetrating a high-bearing material adopted as a standard. The California bearing ratio is then used to determine, by means of design curves, the total thickness of base and pavement required to prevent shear deformation in the given sub-grade soil."

Mr. Turnbull stressed the practicality and economical design the method afforded for military airports. He credited it, and studies by the Corps of Engineers which were based on it, with providing for the design engineer "a better means of choosing the design", and for the field engineer "a better tool for control of construction".

Another Corps of Engineers speaker was Charles R. Foster, Assistant Chief, Flexible Pavement Branch, U. S. Waterways Experiment Station, Vicksburg, Miss. He reminded his listeners that, as far as the airplane designer is concerned, it is advantageous to use single-wheel assemblies in the landing gear of heavy modern planes. But as far as the airfield pavement designer is concerned, single-wheel assemblies are the least advantageous, because they require the greatest thickness of base pavement to support the plane. Multiple-wheel landing gears require less thickness of base and pavement, but generally weigh more. For bombers, primary emphasis

can be placed on range. But Mr. Foster urged that for transport use, both military and civil, an economic balance between airplane design and landing-field

design must be reached.

Using charts and slides, he outlined for the civil engineers the methods used in studies which he and his associates have made to determine economical means of designing airport pavements.

Wire-Torsion Tester

A new torsion-testing machine for wire has been developed by the Sonntag Scientific Corp. and is sold by the Baldwin Locomotive Works, Philadelphia 42, Pa. It is said to test steel tie wire, and similar wires, with diameters from 0.09 to 0.75 inch in accordance with ASTM specifications.

Three twisting speeds, 10, 20, and 30 rpm, with reversible rotation, are available with a maximum torque of 1,000 inch-pounds. Stresses up to 80,000 pounds per square inch can be obtained on 1/2-inch specimens, says the manufacturer. The specimen can be pre-loaded in tension, and a reset-type counter disengages automatically when the specimen fails.

Richkraft Has New Sales Manager, Distributorship

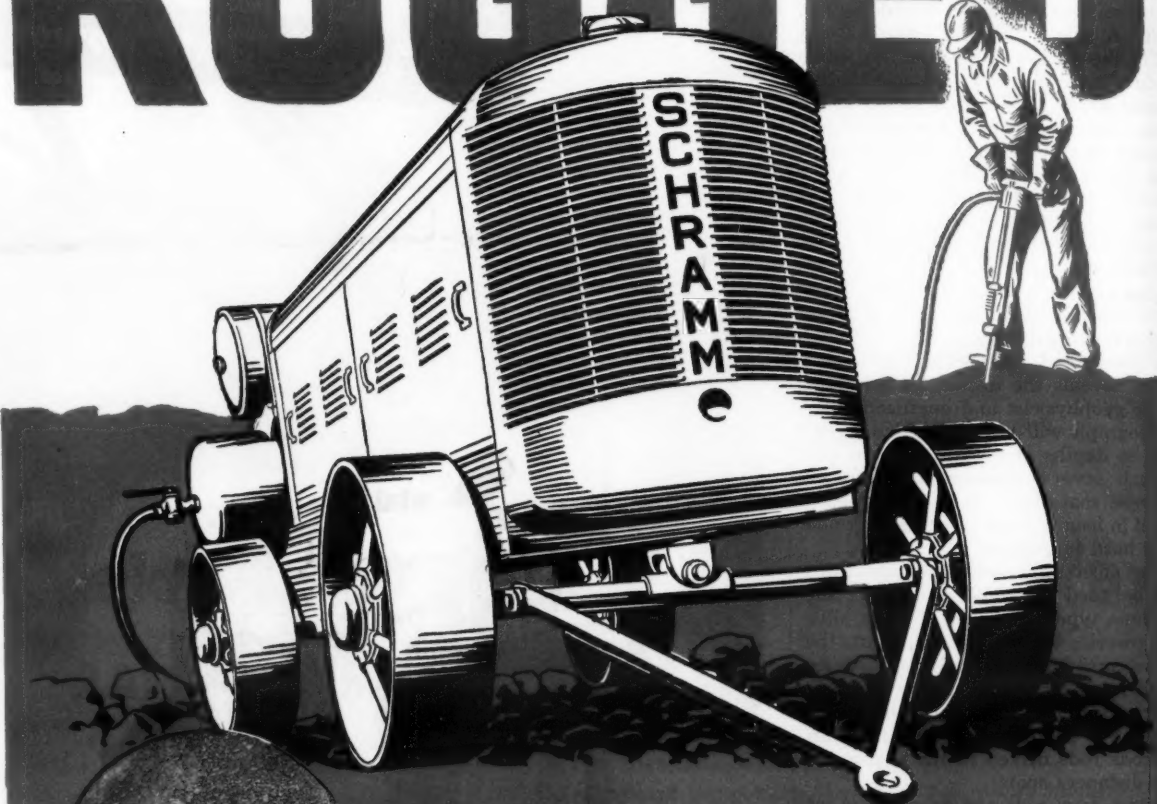
The Richkraft Co., Chicago, has been appointed sole distributor of Silvercote Products Co. reflective insulation papers in the building and construction fields.

Distribution of Silvercote insulation will be handled through Richkraft's national sales organization as a companion product with Richkraft building papers, Richkure concrete-curing compounds, and Richlume waterproof, insulating roof coating.

At the same time, Richkraft announces the appointment of John J. Fitzpatrick as General Sales Manager. Mr. Fitzpatrick is a graduate of the University of Illinois School of Architecture, and has since been in building and construction work continuously. He assumed his present duties on September 1, 1946.

Mr. Fitzpatrick formerly was with the Portland Cement Association and the Marquette Cement Mfg. Co., Chicago.

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Of course, they're rugged! Every Schramm Portable Compressor is built to stand up on the toughest quarry jobs year in and year out. 100% water cooling guarantees safe operation in any climate, no matter how warm or how cold. Look at just a few of the other features that assure long, trouble-free operation: (1) Main bearings for every cylinder, (2) mechanical intake valve, (3) more cylinders and lighter parts, and (4) forced-feed lubrication to every moving part.

Whatever your compressed-air requirements—for one hand-held drill or wagon drill, or several of them, you'll be way ahead in operation and maintenance costs with a RUGGED Schramm Portable Compressor supplying the power.

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New Paving Job May Whip Joint Pumping

Contractor Puts Special Concrete Sills Centered Under Expansion Joints In Concrete On U. S. 40

EXPANSION-joint pumping, long a source of annoyance to design and maintenance engineers, may be a thing of the past on a new 1.749-mile section of 22-foot concrete pavement in Kansas. Design engineers of the State Highway Commission of Kansas ordered special concrete pavement supports poured under all expansion joints in the new \$90,350 job on U. S. 40, located near Wamego. Contractor J. A. Tobin of Kansas City, Kans., did this work on a low-bid contract price of \$3 per square yard for 9-7-9-inch paving. About 23,340 square yards was involved.

The new pavement support on this job was tried out experimentally in the eastern part of the state and has so far been successful. It is quite simple. It consists of a piece of concrete, as wide as the pavement, 18 inches long and 9 inches deep, poured in advance of the main slab. The expansion joint is centered in these blocks of Class A concrete, with no dowel bars. A coat of asphaltic paint on the footing will permit the slab to move horizontally. The joint consists simply of two 11-foot sheets of asphaltic expansion-joint material an inch thick, placed 2 inches below the top of the slab. The expansion material is supported during the pour, and its cap and bracing removed as soon as the concrete fills around each side.

This design does not mean that expansion joints are poured close together. They are spaced on very wide centers, 488 feet to be exact. Dummy contraction joints at 20.33-foot centers will take care of surface shrinking.

Labor Shortage

When work began on August 10, 1946, Tobin had only 50 working days in which to do the job. Earlier this year the grading had been prepared by M. W. Watson of Topeka, Kans. This consisted of 251,500 cubic yards of \$0.16 common excavation. When Tobin moved in, the common labor in the neighborhood was either busy on farms, working in the numerous dehydrating plants near by, or taking advantage of the 52-20 Club.

The labor shortage became so acute locally, in fact, that some men had to be imported from Kansas City, Mo. One hectic day a 340-foot slab pour was made by two operators, three finishers, and three laborers. Superintendent Mike Dowling, Paving Foreman L. Baker, and an anonymous "catskinner" worked together that day, lining forms and preparing subgrade, far out ahead of the machines. A 60-year-old subgrade foreman who has been with Tobin for many years set the concrete forms.

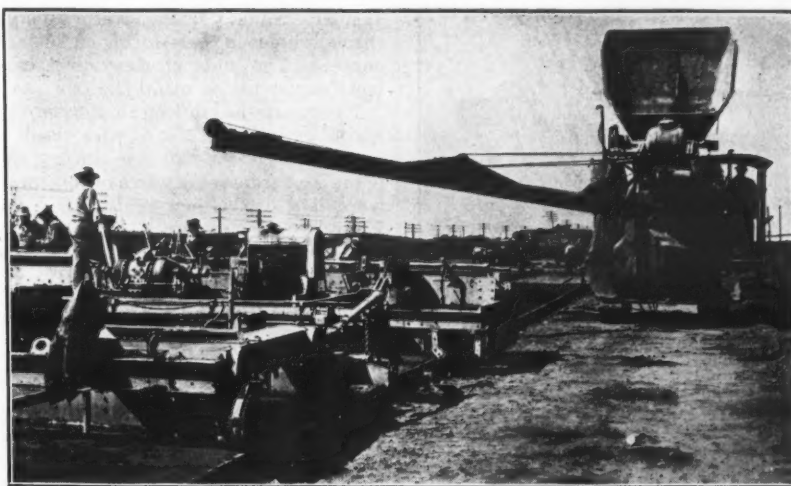
Fine-Grading: Form Setting

At the time the project was visited for

CONTRACTORS AND ENGINEERS MONTHLY, the western half of the pavement had been poured and machines had moved east of a new bridge to continue the paving. This bridge was being built under a separate contract.

Concrete was being dry-batched at a plant on the Union Pacific railroad, and hauled about 3 miles to the job. From five to eight trucks of various makes were used.

The sandy subgrade was prepared by Tobin's Caterpillar motor grader, working to survey blue-tops set by the Highway Commission. A shop-made device consisting of a Ford engine with a digging screw from a mechanical form-grader was used to excavate a form trench, in which Blaw-Knox and Truscon forms were set.



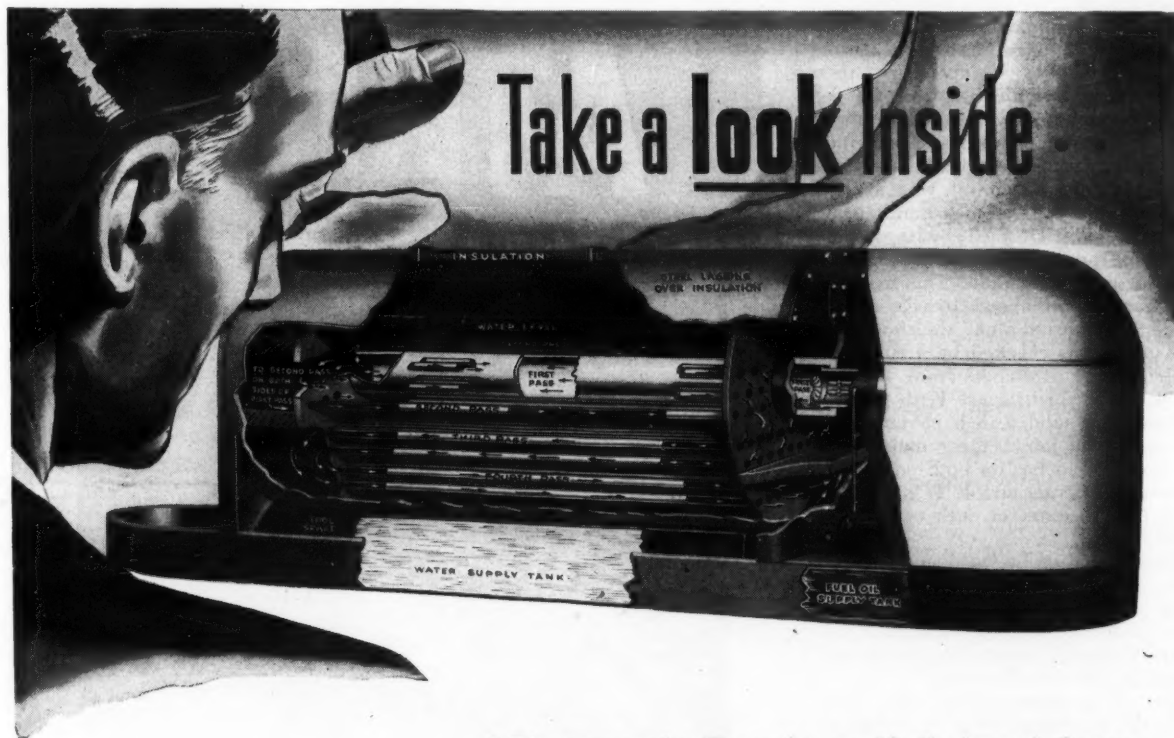
C. & E. M. Photo

This view shows the line-up of finishing machines and the Rex 27-E single-drum paver J. A. Tobin used on 1.749-mile section of 22-foot concrete.

About 4,000 linear feet of these steel forms were available. They were kept ahead of the paver by at least 1,000 feet

most of the time, depending on the labor situation. They were occasionally set

(Continued on next page)



• • to see why you get hot, dry steam faster with less fuel and water

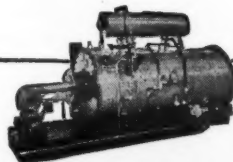
• The cross-section illustration graphically shows the famous Cleaver-Brooks four-pass down-draft construction which, with integral oil-burner, accounts for the remarkable efficiency of Cleaver-Brooks steam generating equipment.

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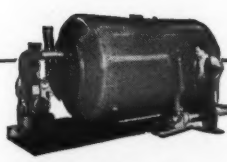
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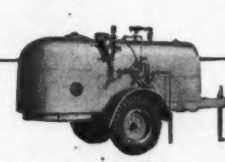
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C. & E. M. Photo
This shop-made device, consisting of a Ford engine with a digging screw from a mechanical form-grader, excavated a form trench on the Wamego job.

New Paving Job May Whip Joint Pumping

(Continued from preceding page)

by as few as three men; but sometimes when the labor all showed up, as many as eight men were used. The forms were aligned by two experienced men who have been with the Tobin Co. for many years. A Cleveland form tamper was used to tamp the bases, on which dirt was left to prevent the concrete from sticking. Form oil was applied ahead of the pour from a hand spray.

A Caterpillar D7 tractor with a shop-made fine-grader was used to scoop excess earth off the grade. This material was carried on ahead by the motor grader and wasted along the shoulders. The grade was checked by a rule, and a string line stretched from the top edges of the steel forms. With the exception of a solid 9-inch pavement at the expansion joints, the remainder of the slab is 9 inches on both edges and at the black center stripe. It is 7 inches thick in the center of each of the two lanes.

The finished grade was compacted by three passes of a Buffalo-Springfield 6-ton tandem roller. Density tests were then run by laboratory technicians attached to the office of Resident Engineer George S. Davis in Wamego.

The center-plane-of-weakness joint was made by staking 10-foot sections of 10-gage steel forms along the center stripe of the pavement. Transverse dowel bars 36 inches long, cut from

½-inch round stock, were spaced through holes in these forms on 24-inch centers. The ends of the dowel bars were supported on metal chairs.

The concrete slab was reinforced full width by placing No. 4 wire mesh 2 inches below the surface during the pour. The transverse wires of this mesh were laid on 12-inch centers and the longitudinal wires on 6-inch centers. The mesh was worked in just behind a Jackson vibrator.

Pouring and Finishing

A Rex 27-E single-drum paver with a 30-foot steel boom was used on the shoulder of the new slab for mixing and dumping the concrete. Its dual-gate bucket was able to reach all parts of the 22-foot slab. Batch trucks hauling two 27-cubic-foot loads backed in and dumped directly to the paver skip. Mixing water was obtained from a creek halfway through the job and pumped to the site through 2-inch pipe line. Concrete was mixed 60 seconds and dumped on the subgrade.



C. & E. M. Photo
Here is a general view, from the finishing end, of the concrete-paving job on U. S. 40 near Wamego, Kans. J. A. Tobin, Kansas City, Kans., was the contractor.

The concrete was held to such rigid water-cement specifications that slump tests in a 12-inch cone were approximately an inch, according to the paving

foreman. After a Blaw-Knox spreader and a Jackson vibrator worked this concrete down, it was so dense that
(Concluded on next page)

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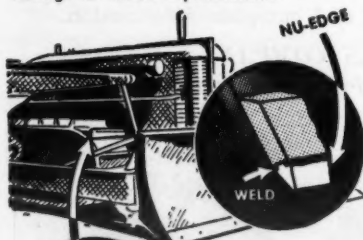
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C. & E. M. Photo

A finisher uses a $\frac{1}{2}$ -inch-radius tool along the pavement edge, to keep it from cracking or spalling.

New Paving Job May Whip Joint Pumping

(Continued from preceding page)

steel wedges for dummy contraction joints had to be sledge-hammered to drive them in. A Blaw-Knox finishing machine followed the spreader, and was in turn followed by a Koehring Longitudinal Finisher. The final finish for the pavement was a herringbone effect secured by two 6-inch canvas finishing belts, hand-operated.

A home-made bridge was used for cutting contraction joints and hand-finish their edges. Another bridge was used to apply the black iron-oxide striping material, and a final bridge for applying Hunt Process Clear curing solution completed the line-up of mechanical equipment.

The surface of the new pavement was crowned $1\frac{3}{4}$ inches to take care of drainage. Every expansion joint will have its own hand-built French drain of porous gravel; this will take away through the shoulder any rainwater or seepage that may collect around these joints.

Approximately 8,000 cubic yards of common excavation and grading in the Tobin job was also done after the paving was finished. This consisted of removing the old concrete pavement and preparing new shoulders along the concrete job.

When entirely completed, the new section will help to handle heavy transcontinental and local traffic over U. S. 40 and U. S. 24. With accurate counts of traffic and axle-load frequency figures available, the State Highway Commission of Kansas will watch this test section closely. If the special supports stop pumping at the joints without causing the slab to crack on either side, it will be a practical result of the 1946 meeting of the Highway Research Board and the American Association of State Highway Officials, where the problem of expansion joints was "cussed" and discussed.

Personnel

R. C. Keeling is the State Highway Engineer of Kansas. This work was done under the direct supervision of George S. Davis, Resident Engineer. George E. Tiffany is Engineer of Construction.

Falk Opens New Territory

A new sales territory has been created by the Falk Corp. to cover Wisconsin, upper Michigan, and parts of Iowa. The new territory will have L. H. Billing as its District Manager. Mr. Billing has been with the corporation for twenty years, and has held many key positions, including that of Production Manager.

Reserve of Planned Public Works Exists

A large number of state and local governments have public-works plans already made, or in the design stage, to go into effect as soon as the present high demand for private construction diminishes.

This information was made public by Major General Philip B. Fleming, Federal Works Administrator. The report also stated that Federal funds in the amount of \$26,465,853 have been advanced to 2,174 different public bodies scattered throughout the country, for use in the plan preparation of public works with estimated construction costs of \$929,948,000. The public bodies co-operating in the advance planning program of the Bureau of Community Facilities include 28 state governments, 182 counties, 1,524 cities, towns, and townships, 403 separate school districts, and 37 special districts.

In addition, state and local preparations without Federal aid in-

clude plans in the design stage for public works with estimated construction costs of about \$4,000,000,000.

The leading types of public works for which plans are completed are those essential to housing. However, completely planned Federal-Aid and state highway and road projects reach an estimated construction cost of \$652,774,000; projects in the design stage, \$2,556,744,000.

New Small Dirt-Mover

As we go to press, news has reached us of a new small Tournapull now in production at the Peoria, Ill., plant of R. G. LeTourneau, Inc. The new dirt-mover will be self-loading, with a carrying capacity of $3\frac{1}{2}$ struck yards.

The company expects to have the first units in the hands of its distributors in about 30 days.

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The Executive Committee of the Associated Equipment Distributors makes plans for the group's 28th Annual Meeting to be held at the Edgewater Beach Hotel, Chicago, February 13-15. Left to right, G. W. Van Keppel, Kansas City, Mo., Chairman, Advisory Board; W. W. Bucher, New York City, Treasurer; O. B. Bjorge, Portland, Oreg., Chairman, Finance Committee; C. F. Winchester, Washington, D. C., Executive Secretary; F. B. McBath, Portland, Oreg., AED President; William A. Danner, Hyde Park, Mass., Executive Vice President; A. F. Garlinghouse, Los Angeles, Calif., Vice President; G. E. Hillsman, Chicago, Member, Finance Committee; and C. F. Halladay, Sioux Falls, S. Dak., Vice President.

AED 28th Convention In Chicago Next Month

The 28th Annual Convention of the Associated Equipment Distributors will be held February 13, 14, and 15, at the Edgewater Beach Hotel, Chicago, Ill. Meetings will begin at noon on the 13th and will conclude the following Saturday afternoon. The annual banquet is scheduled for the evening of February 14.

The industry's adaptation from wartime to peacetime status will be the basis for most discussions at the convention. High on the list of subjects to be taken under discussion will be the disposal of surplus Government-owned construction and road-building machinery. Business administration, financing, and advertising will receive prominent places on the program.

F. B. McBath, Portland, Oreg., AED President, will preside over the convention. Executives of the construction equipment and other industries will appear on the program as speakers. Reports from the AED committees will be presented and recommendations from them will be considered for adoption by resolution. Election of officers for the coming year will be held during the convention.

Executive Vice President Danner is Chairman of the Program Committee, and A. F. Sersanous, Portland, Oreg., is Chairman of the Entertainment Committee.

Rubber-Hose Bulletins

Catalog sections are now available on two types of rubber hose made by The B. F. Goodrich Co., Akron, Ohio: the regular water hose, and a suction hose

for excavating and general utility service.

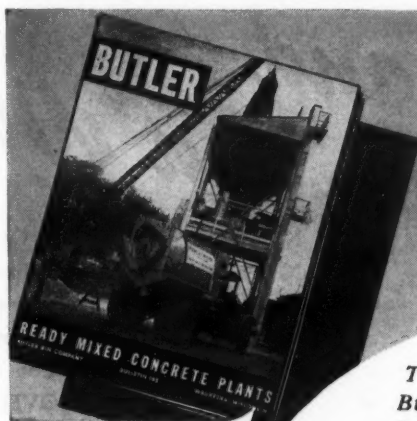
Both folders list, for each type, the size, weight, outside diameter, maximum length, and pounds of working pressure. Typical applications are named for each type and size, to help in determining which is best on any particular job. A feature of one grade

of suction hose, Spiralock construction, is reviewed; it is designed to provide a smooth-bore hose, for either suction or discharge service, that is lightweight and easy to bend.

The catalog-section number for the suction hose is 4600, and for the water hose, 4800. Both sections are punched for insertion in a looseleaf folder.

Turner Executive Dies

J. Archer Turner, well known in the engineering and construction professions, died November 1, 1946, at the age of 61. Until shortly before his death, Mr. Turner was President and Chairman of the Board of Directors of Turner Construction Co.



BULLETIN C-185
Butler Ready Mixed, Concrete Plants. 24 pages of illustrations.

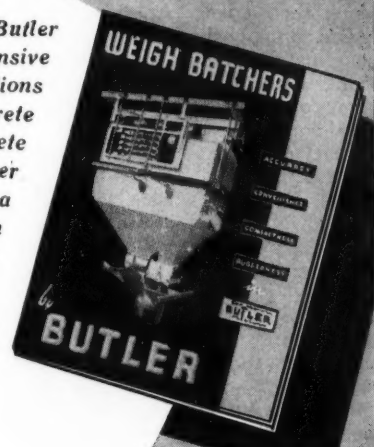


BULLETIN C-260
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BULLETIN C-150F
Completely describing and illustrating Butler Weigh Batches. 12 pages.



BULLETIN C-210C
Emphasizing design and use of Butler Portable Bulk Cement Plants. 16 pages.

NOTE—BULLETINS 150F AND 210C SHOWN AT RIGHT ARE SCHEDULED FOR RELEASE APRIL 15TH, 1947. BECAUSE OF PAPER SHORTAGES, THE EDITION WILL BE LIMITED. PLEASE ENTER YOUR REQUEST NOW.

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CONTINENTAL RUBBER WORKS
PITTSBURGH, PENNSYLVANIA, U.S.A.

Rolled-Earth Dikes

(Continued from page 1)

mate, to a high bid of \$239,488. Although authorized by both the 1936 and 1938 Flood Control Acts of Congress, the project was at first delayed, and then postponed because of the war. It did not get started until July 1, 1946. The City of Nashua has provided 9 acres of land along the river front on which the flood-protection structures are being built. The site is about a mile east of the center of the city, near where State Highway 111 spans the Merrimack between Nashua and the village of Hudson on the opposite bank. Running back from the river are the great mills which, without this encircling dike, would be at the mercy of the river should floods again roar down the valley. The tracks of the Boston & Maine Railroad following the river route also lie in the lee of the protecting embankments.

Features of Contract

In addition to clearing and grubbing the site, the contract includes the construction of rolled-earth dikes of impervious fill. These have a total length of about 3,400 feet located both north and south of the highway bridge, and are protected at certain locations with a blanket of riprap. The dikes are built about 32 feet, on the average, back from the river. They vary in height from 4 to 10 feet according to the topography of the ground, since they are constructed to elevation 122. Although this elevation is less than the crest height of the damaging floods of recent years, the new dike height is considered ample protection, for flood-control dams have been erected higher up on the river since the flood years.

Inasmuch as it was necessary to carry flood protection across Bridge Street at the west end of the Tayler Falls Bridge, concrete wing walls were constructed connecting the ends of the dike on each side of the street to the concrete wall of the bridge. Construction of these wing walls made a stop-log structure in Bridge Street unnecessary.

With the building of the new walls and dikes, the existing drainage system which emptied into the river at this point had to be revised. A 2 x 3-foot box culvert had to be closed off, along with a 10 and a 42-inch sewer pipe line; the latter carried storm and sanitary sewage from the city. These outlets, which were never used to capacity, were diverted to a 36-inch reinforced-concrete pipe line installed behind the dike to carry the flow to a new pumping station. At another point an 18 and a 54-inch storm-water line were also intercepted and closed off; their flow was diverted into a new 54-inch main which also connects to the new pump house 100 feet away.

The new pump house is a 25 x 23-foot reinforced-concrete structure with walls 18 inches thick, and designed with a sump measuring 14 feet square and 19 feet deep. When the river is at normal level, the drainage from the land side to the river side of the dike is by gravity flow through a 54-inch square box conduit built beneath the embankment. Should the river rise above the level of this outlet, the conduit would then be closed by a gate at the pump house and the sewage pumped from the sump through the box culvert.

In case the pumps cannot take care of the drainage, an emergency overflow basin has been constructed of rolled random fill shaped to a dike cross section and measuring 300 x 100 x 5 feet high. The pumps, which will be furnished and installed in a subsequent contract, will include two 25,000-gpm units for storm water, and one 4,500-gpm pump for sewage. They will be electrically powered.

The Dikes

The contractor started work by clearing the wooded site with a force of ten men equipped with axes and machetes, assisted by two tractor-dozers which were used in piling up the brush. These dozers, a Caterpillar D7 and an Allis-Chalmers HD-7 with a Baker 9-foot blade, also helped to level the site and strip off the topsoil to an average depth of 12 inches to make a satisfactory base for the dikes.

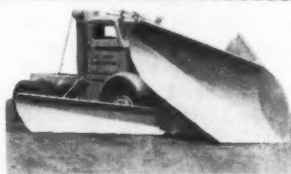
Two shovels then moved in, a Lorain 1½-yard and a Lima ¾-yard. The former was used in the clearing to remove stumps, and also to excavate the core trench which runs along the center line of the dike. It was dug 4 feet wide to a depth of 4 feet with 1 to 1 side slopes. The Lima was equipped with a pull-shovel for excavating the trenches in which the drainage pipe was placed. The pipe was laid entirely in open trenches; no sheeting was required since the slopes were flattened back in this open country. As the bottom of the trenches was well above the

level of the river, the excavation was dry and no pumping equipment was needed. The timber removed from the site was sold to local lumber mills.

After the site was cleared and the center-line core trench excavated, a toe drain was laid to be located under the dike at the toe of the land-side slope. The drain consisted of 6 and 8-inch perforated bituminous-coated corrugated-metal pipe; the trench was

backfilled with sand and gravel. An 18-inch layer of compacted random fill was then placed over the stripped ground from the core trench out to the land-side toe of the slope. The rest of the dike material is an impervious mixture of silty clay, sand, and gravel obtained from a borrow pit 2¼ miles from the job site. At least 15 per cent of this material was required to pass a No. 200

(Concluded on next page)



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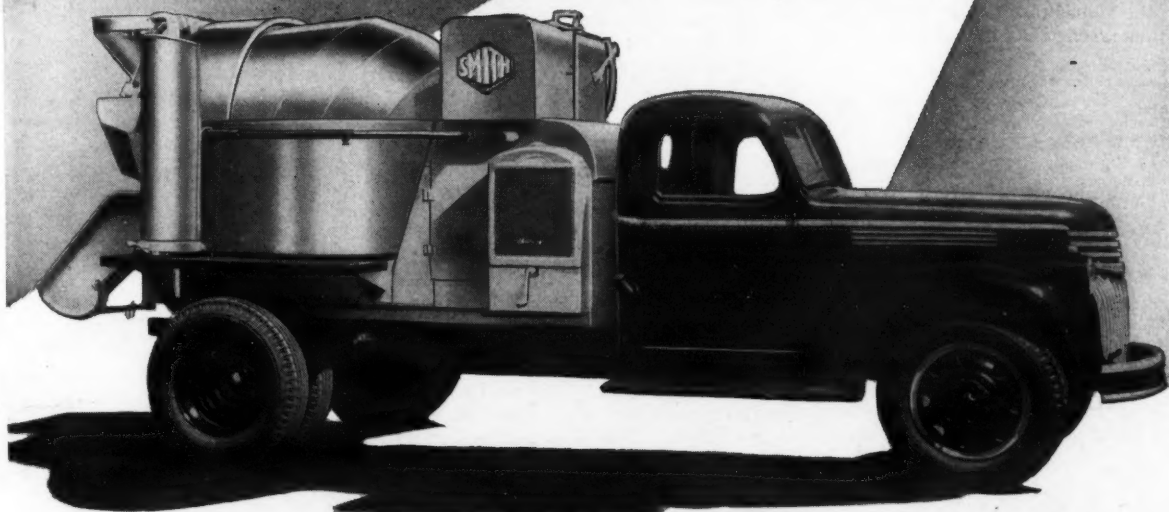
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THE Original HIGH DISCHARGE TRUCK MIXER AND AGITATOR

Rolled-Earth Dikes

(Continued from preceding page)

mesh sieve, and any stones over 6 inches in size had to be removed.

The impervious borrow was excavated with the 1½-yard shovel and hauled to the job in a fleet of 12 Mack and Sterling trucks. They were owned by the contractors, and they carried from 8 to 9 cubic yards a load. The fill was placed in 6-inch layers at the optimum moisture content and on a 1 per cent grade to insure proper drainage. A constant supply of water had to be on hand for wetting the fill as it was placed at any point on the job. So a 1½-inch cast-iron pipe was strung out ¾ mile long on the river bank from one end of the dike to the other. Water was pumped from the Merrimack by two Jaeger pumps, a 2 and a 4-inch, which were moved about to where the filling was in progress. The pumping head was slight, and the water was distributed at adequate pressure and sprayed over the fill through a ¾-inch hose connected to tees inserted in the pipe at 200-foot intervals.

Each 6-inch layer of fill was compacted by at least six passes of the tractors. These moved at a speed of not more than 2½ mph and overlapped each pass by 2 feet as they pulled along a LeTourneau dual-drum sheepsfoot roller. The dikes were built up to elevation 122 with land-side slopes of 2 to 1, river-side slopes of 2½ to 1, and a crown width of 10 feet. The topsoil which had been removed from beneath the dikes was later spread by the dozers along the slopes to a depth of 6 inches, and then seeded with the following:

Chewings fescue	22 per cent
Canada bluegrass	19 " "
Orchard grass	15 " "
Redtop	13 " "
Timothy	5 " "
Other materials	26 " "
	100 " "

The sand and gravel used in the toe drains conformed to the following gradation:

Sieve Size	Per Cent Passing
2-inch	100
1-inch	75-100
No. 4	35-70
No. 20	12-40
No. 100	2-12
No. 200	0-5

Concrete Wall

To support the concrete walls, steel

sheet piling in 26-foot lengths was driven to elevation 85 by a McKiernan-Terry 7B3 double-acting hammer; the hammer was operated by compressed air contained in a receiver which was kept filled by an Ingersoll-Rand 315-cfm and a Gardner-Denver 105-cfm compressor. The hammer was swung from a 45-foot crane boom which replaced the pull-shovel attachment on the Lima.

The walls are 17 feet high and taper from a width of 17 inches at the bottom to 9 inches at the top. The interlocking piling is embedded 6 feet into the concrete. On the land side the wall is backfilled with sand and gravel. On the river side 12-inch riprap obtained from a near-by quarry is placed on a 2 to 1 slope beginning 3 feet above the bottom of the wall and continuing down to the river. For the wall pours, truck-mixed concrete purchased from the plant of E. A. Wilson at Lowell, Mass., 12 miles away, was used.

Quantities and Personnel

The major items in this flood-protection dike contract are:

Excavation	13,800 cu. yds.
Borrow	28,000 cu. yds.
Toe drain, 6 and 8-inch	2,350 lin. ft.
Reinforced-concrete pipe, 18 to 54-inch	1,375 lin. ft.
Riprap	700 cu. yds.
Reinforcing steel	70,000 lbs.
Concrete	582 cu. yds.
Steel sheet piling	5,257 sq. ft.
Seeding	3½ acres

An average force of 25 men has been employed on the project under the direction of Timothy F. Cronin, Superintendent for the Northern Construction Co., Inc., and the Lawrence Sand & Stone Co. E. J. Steed is Resident Engineer for the U. S. Engineer Department, of which Brig. Gen. Raymond G. Moses is Division Engineer of the New England Division, and C. J. Murray is Chief of Operations. The Division Engineer of the New England Division is in charge of all flood-control projects in that area.

Firebox Boilers

A new bulletin, which illustrates and describes the line of riveted or welded double-pass steel firebox boilers made by The Brownell Co. is now available. These boilers, built especially for stoker, oil, or gas firing, range in capacity from 26 to 305 hp.


To obtain a copy of the bulletin, address The Brownell Co., 424 No. Findlay St., Dayton 1, Ohio, and request bulletin No. RM-1.

Joins Nelson Sales Staff

Appointment of Robert C. Friedly as Construction Specialist for Nelson Sales Corp. of Lorain, Ohio, has been announced by the firm.

In that position, Mr. Friedly's initial assignment will be to establish complete

application specifications for Nelson stud welding in construction. Current applications include the installation of corrugated-asbestos and sheet-metal roofing and siding, sprinkler systems, wireways, conduits, piping, and insulation. Mr. Friedly's headquarters will be at Lorain, Ohio.




The Leader
IN WELDED CONSTRUCTION
WELLMAN
Williams Type BUCKETS

Wellman pioneered in the welded construction of rolled steel buckets. Priceless experience, superior engineering and the finest type of construction guarantee you more satisfaction from your Wellman-built buckets.

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There's More of Everything You Want and Need for the Trenching Job

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Speed, Mobility and Maneuverability

Power, Strength and Durability

Ease of Handling and Operation

Low Maintenance and Operating Costs

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO
"CLEVELANDS" Save More . . . Because They Do More



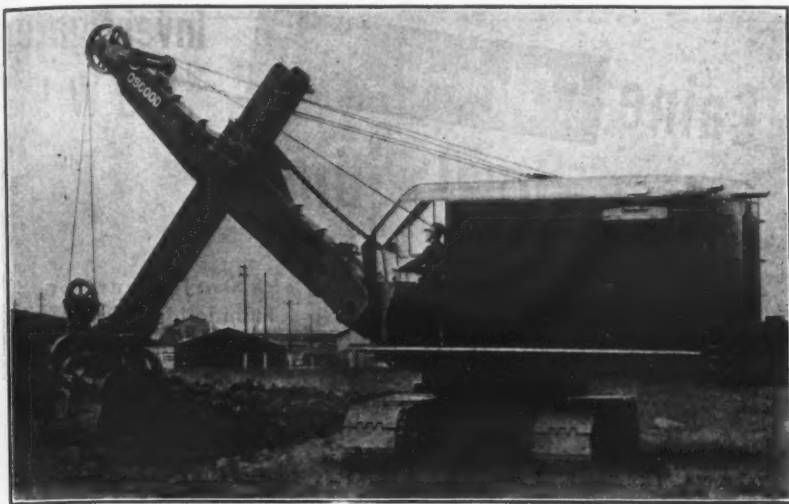
SAVE with **STERLING'S TUBULAR FRAME**

In Sterling's All-Steel Wheelbarrow with Tubular Frame, you get the most barrow for your money. Cost-saving features include: steel tray with lapped corners — All welded construction, no rivets — Steel reinforcing rod around top edge — V front braces and cross supports — All parts securely anchored to the sturdy one-piece steel tube. Truly a barrow that withstands hard usage over a long period of time. Be sure to specify **STERLING** on your next barrow order. Delivery will be as prompt as conditions permit.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of **STERLING** Quality

Sterling WHEELBARROWS



The new Osgood Type 81, for use as shovel, dragline, clamshell, crane, and backhoe, features air controls. It comes in three crawler-mounted models, and one pneumatic-tired model is also available.

Crane Unit Features Use of Air Controls

The Type 81, a medium-size machine for use as shovel, dragline, clamshell, crane, and backhoe, and featuring "smooth-as-steam" air control, has been announced by the Osgood Co., 1946 Thomas St., Marion, Ohio. There are three crawler-mounted models: the 810 and 816 of 1½ and 1¾-cubic-yard capacities; and the 817 with a wide-tread crawler and a long crane boom for dragline, clamshell, or crane service. The Type 81 is also available as an Osgood Mobilcrane, the Model 815 self-propelled and one-man-operated crane mounted on pneumatic tires.

The operator of the 81 sits behind a panel of short-throw levers which control metering-type air valves. Other control levers and pedals are in front and to his right. He uses the Osgood Air-Cushion Clutch to apply power for hoisting and crowding, swinging, traveling, and steering motions. Power is carried from the engine to the reversing shaft through a roller chain, fully enclosed. The spiral bevel gears which furnish the reversing action to the swing and travel gears are also enclosed and operate in an oil bath. The drum shaft is ball-bearing-mounted, with skeleton-type drums.

A swing brake, operated by air, is mounted on the lower end of the vertical reversing shaft. It allows the operator to spot the dipper or load quickly, smoothly, and accurately, the manufacturer says. An automatic swing lock is engaged when the swing clutch is disengaged. The standard boom hoist operates through the swing and travel clutches, by air, with the final drive fully enclosed. Additional safety factors are an automatic safety brake and a locking pawl for positive locking. An independent boom-hoist unit which can be furnished is activated by two Twin Disc clutches, and has all the safety features of the standard boom-hoist unit.

By means of an Osgood patented rotary coupling, air is taken down through the vertical travel shaft to the steering clutches and brakes on the cross-travel shaft. This allows the machine to be steered in any direction without stopping its forward motion, and with the cab in any position. A dig-

ing lock on the cross-travel shaft pre-

vents movement of the machine while

it is digging. The crawler truck frame is a heavy steel casting, with truck side frames of full-depth U-sections, carried down low to the treads to exclude foreign matter from the tread belts.

Wheels are equipped with air brakes, which can be used as both service and holding brakes. Four speeds are obtainable, up to 5 miles per hour.

Further information can be obtained from the company on mention of this news item.

Gradall Distributors

The appointment of four distributors for Gradall, the multi-purpose earth mover manufactured by The Warner & Swasey Co. of Cleveland, has been announced.

W. W. Williams Co., located in both Columbus and Cleveland, will distribute the machine in Ohio. Construction Equipment & Supply Co. of Pittsburgh will handle sales in western Pennsylvania. Telford Equipment Co., Lansing,

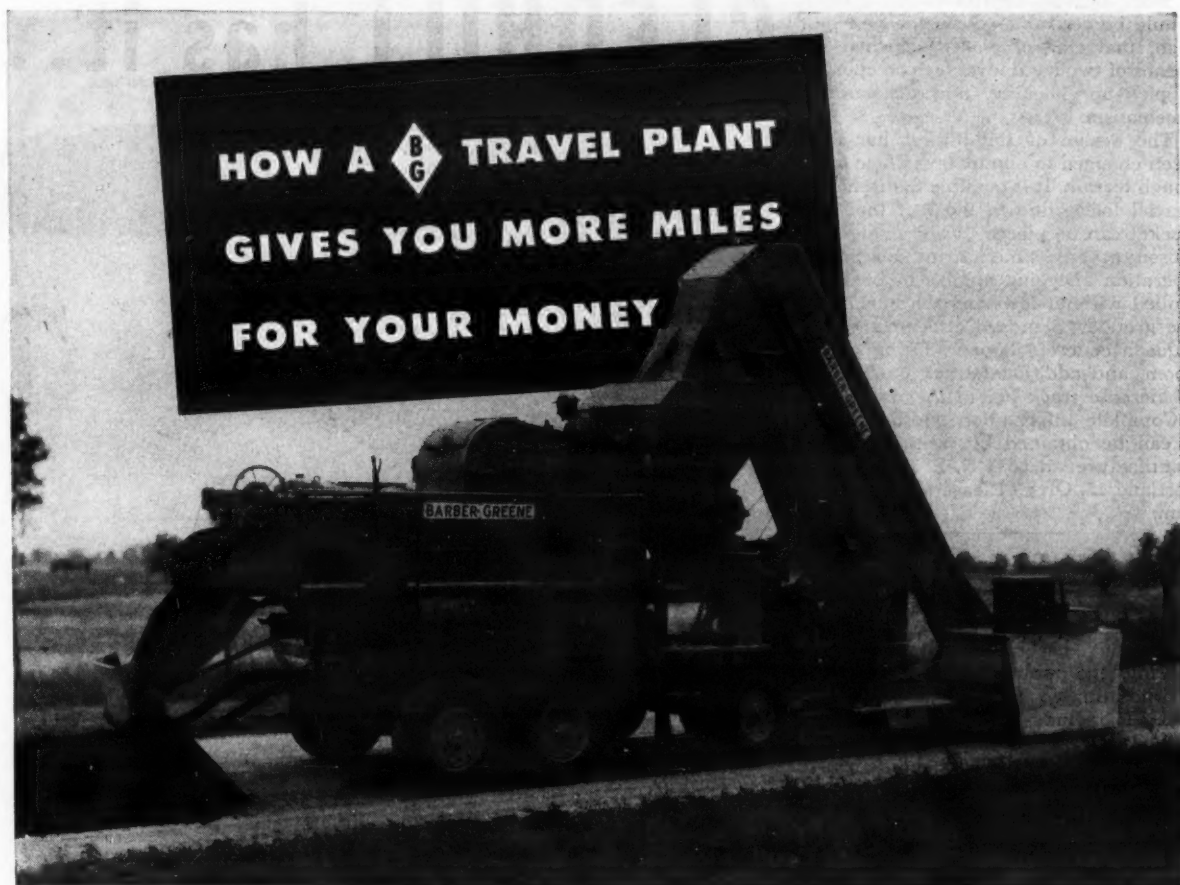
Mich., will handle sales in that state. All of New York State, with the exception of metropolitan New York City, will be serviced by Rupp Equipment Co., Buffalo.

Automatic Electrodes

A line of automatic arc-welding wires and tapes is announced by the Air Reduction Sales Co. as a supplement to its Airco brand of manual electrodes. It consists of five knurled-type wires and five tapes, all for flat-position operation.

The wires and tapes are manufactured in several diameters and are designed to meet the general requirements of high-speed-production welding. These automatic wires may be used separately, or in conjunction with the tapes, depending upon the job to be performed.

For further information on this group of products, please direct your inquiry to Air Reduction, 60 E. 42nd St., New York 17, N. Y., and mention this notice.



● Building longer lasting asphalt roads is only one of the ways a Barber-Greene Travel Plant gives you more for your money.

Here's how a B-G Travel Plant cuts down construction expense to help you stretch limited funds into more miles of completed highways:

* Continuous, high quality production. No batches, no pauses. No human element to lower capacity... no dependence on operating skill to maintain consistency.

* Reduction of the weather hazard. No partially-prepared material to be spoiled by sudden showers.

* Full working periods. Short mixing cycle permits operation on colder days, later at night, earlier and longer in the season.

* No sacrifice of bitumen quality to allow for time-consuming blading. No rich or lean spots.

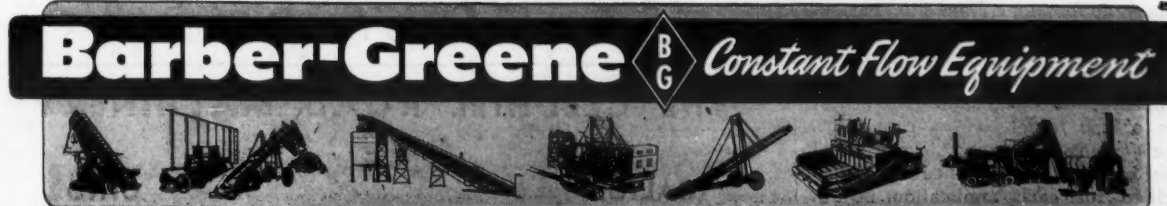
Lower percentages of heavier and quicker-setting bitumen with less solvent produce uniformly-coated mixes.

* Easy job coordination. Mixing and proportioning performed by a single unit under control of two or three men. When aggregate is windrowed well ahead, it's automatically available as needed.

* Low investment. Cost of the B-G Travel Plant is no more than that of the necessary machines for mixed-in-place construction of the same mileage.

* Versatility. Handles all types of bituminous and stabilized work. Can be centrally located for maintenance requirements... becomes an integral part of Central Plant set-up for production of high-type mixes.

Write for catalogs describing how the economical operation of B-G equipment enables you to surface roads with plant-mixed material at blade-mix cost. Barber-Greene Company, Aurora, Illinois.





The new Model B Scoopmobile features more flexible control of the bucket by means of two hand levers.

Bucket Control Now Features End-Loader

A new model Scoopmobile which embodies major changes has been announced by the Mixermobile Manufacturers. The Scoopmobile is a 3-wheeled materials-handling machine of the end-loader type.

It was felt by the manufacturer that a more flexible control of the bucket would be desirable. So in the new design, that control is accomplished by means of two hand levers which operate a pick-up, hoisting, and discharging mechanism.

The design of the bucket has also been changed to eliminate spillage over rough terrain. It is possible to discharge partial loads, due to the fact that the bucket can be placed in any angle and closed at any time during discharge operation. Digging angle can be controlled without lowering the bucket to the ground. Standard attachments include a concrete hopper, lifting crane boom, and additional track extensions to increase track height up to 18 feet.

Complete information on the Model B can be obtained by writing to the manufacturer at 6853 N. E. Halsey St., Portland 15, Oreg. Please mention this item.

Standards on Cement Brought Up to Date

The 1946 edition of "ASTM Standards on Cement" has recently been issued. It brings the publication up to date by incorporating several changes made in 1946. It includes fifteen standardized methods of testing, a manual of cement testing, references on portland cement, data on analytical balances and weights, and a list of the personnel of Committee C-1 on Cement and its subcommittees. The specification for sieves for testing purposes is included.

The cement specifications cover five types of portland cement, blast-furnace slag portland, air-entraining portland, natural cement, and masonry cement. The testing methods include chemical analysis, compressive strength, fineness, autoclave expansion, sampling, air content, heat of hydration, normal consistency, specific gravity, soundness, tensile strength, and time of setting. Information in the manual of cement testing supplements the standard methods on the physical tests and suggests procedures which should aid in obtaining better uniformity.

Copies of this 190-page book in heavy-paper binding, with a detailed index, may be procured from ASTM headquarters, 1916 Race St., Philadelphia 3, Pa., at a price of \$2.00 per copy.

Protective-Coating Uses

A folder is now available which describes applications for the various types of anticorrosion protective coatings manufactured by the Wailes Dove-Hermiston Corp. under the trade-names Bitumastic and Bituplastic. The center page of the folder, which contains a large composite drawing, is a kind of visual index to these applications. Also specified for each application is the

recommended kind of Bitumastic or Bituplastic coating.

Copies of the visual index can be secured by writing to the Wailes Dove-Hermiston Corp. at 1941 Linden St., Westfield, N. J., and referring to this notice in CONTRACTORS AND ENGINEERS MONTHLY.

Tenn. Valley Distributor

A new distributor company has been organized for the area from Chattanooga to Bristol, Tenn., to handle sales and service of power equipment. Known as the Power Equipment Co., it will have offices at 1218 Island Home Ave., P. O. Box 2311, Knoxville 15, Tenn., and at 600 W. Manning St., P. O. Box 1108, Chattanooga 5.

It has been named authorized distributor for several nationally known manufacturers of construction equipment. Further details about the company and the products it will handle may be obtained directly from either of its offices.

Caine CORR-PLATE Steel Piling



Used the world over for building Foundations, Dams, Retaining Walls, Docks, Levees, Bulkheads, Sewers, Disposal Plants and thousands of other construction jobs.

**STRONGEST
Per POUND WEIGHT**

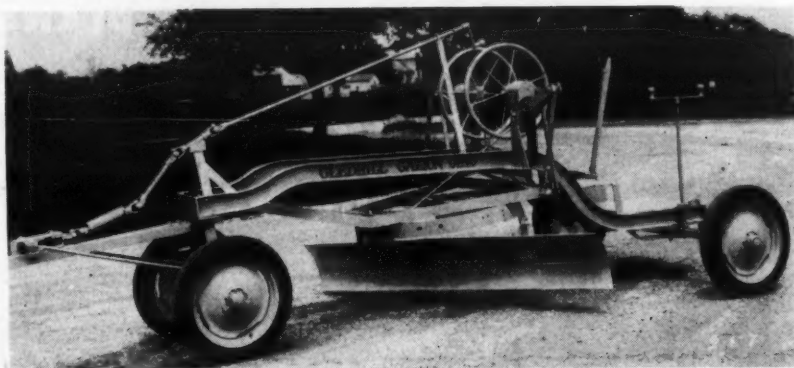
CAINE STEEL COMPANY

1820 N. Central Avenue

STEEL PILING DIVISION

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GLEDHILL has it...



the small grader for BIG performance

LOOK!

- ● ● Pneumatic tires
- ● ● Self locking raising and lowering device
- ● ● Steering gear
- ● ● Timken-tapered Roller Bearing wheels.

It's the finest grader in the low-cost bracket. Immediate delivery. Available with 7', 8', 9' or 10' moldboards.

Write for detailed specifications on this and other Gledhill equipment.

A FEW TERRITORIES OPEN TO
REPUTABLE DISTRIBUTORS

**THE GLEDHILL ROAD MACHINERY
CO.**

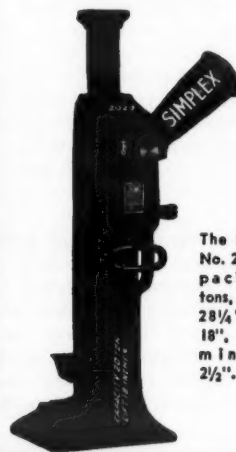
GALION

OHIO



Quite a number of fistic heavy-weight champions have come and gone since Simplex No. 2029 Jack made its bow. Through the years this rugged 20-ton Jack has been the choice of the construction field for building moving, bridge work, moving machinery and heavy engineering operations. Lifts its full 20 tons with greater ease and speed than many jacks of less capacity. No. 2029 has all the well-known Simplex safety features, which lend security to otherwise hazardous lifting jobs. Widely used in pairs, in lieu of cranes, for handling loads exceeding 20 tons.

Templeton, Kenly & Co.
Chicago 44, Ill.



The Simplex No. 2029. Capacity 20 tons, height 28 1/4", lift 18", toe lift minimum 2 1/2".

SIMPLEX
WORLD'S MOST
COMPLETE
LINE OF
JACKS
LEVER
SCREW
HYDRAULIC



Colorado Constructors, Inc., Denver, Colo., operates this new Pioneer 46-VE diesel-electric duplex crushing and screening plant near Denver. A Caterpillar D-17-Y drives the jaw crusher through a 12-inch-wide flat belt, and also an Electric Machinery Co. generator supplying electric power to motors on the vibrating screen and conveyors. The roll crusher is driven by V-belt from the jaw crusher. A new hydraulic-type cradle truck supports the delivery conveyor. One hundred per cent fractured chips are being produced simultaneously with coarse aggregate, a Pioneer feature made possible by the bottom-deck feed.

square feet of shop, warehouse, and office space, and maintains an equipment yard covering over a city block. It recently purchased a 40-acre tract near the Garrison Dam site on the Missouri River, which will be used by Smith Inc., and other equipment distributors, as an equipment center for contractors.

Grinders, Tools Described

A broadside describing its complete line of flexible-shaft machines, high-speed grinders, tools, and accessories has been put out by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. Included in the Wyco line are flexible-shaft machines from 1/4 to 2 hp; high-speed grinders from 1/2 to 1 hp; sanding drums, brushes, buffs, grinding wheels, cutters, and other tools. Detailed specifications and prices are listed for all items.

A free copy is available for the asking from the manufacturer upon mention of this notice in **CONTRACTORS AND ENGINEERS MONTHLY**.

U.S. Annual Snow-Removal Costs Exceed \$30,000,000

The cost of removing snow and ice from the highways of the United States runs annually in excess of \$30,000,000. This figure is exclusive of the costs borne by cities in the snow belt. For the winter of 1944-45, it cost 36 states \$30,909,761 to clear 288,999 miles of roads, using some 50,000 units of snow-removal equipment.

These reports to the Public Roads Administration were summarized by Charles Upham, Engineer-Director of the American Road Builders' Association. Exact figures for the cost of keeping city streets clear are not available.

In addition to the cost of removal, snow causes other revenue losses. In Minnesota, for example, it was estimated that about 2 1/2 times more taxable gas was sold in midsummer than in midwinter. In Virginia, a relatively snowless state, the spread between winter and summer gas sales is only about one-third.

Construction-Equipment

Sales Expanded by Smith

The Smith Commercial Body Works, of Fargo, N. Dak., has had a reorganization. A new company has been formed to be known as Smith Inc. with authorized capital stock increased to \$300,000. The new corporation will emphasize the sale of general construction

equipment and truck and bus equipment. The manufacture of bodies for

trucks was discontinued in November. The corporation occupies over 25,000

Marches On!

... WITH THIS TOP FLIGHT LINE OF MONEY MAKING Equipment

CONCRETE MIXERS

PLASTER-MORTAR BITUMINOUS MIXERS

DIAPHRAGM PUMPS

DUAL PRIME PUMPS

BUILDERS' HOISTS

CONCRETE GUNS

Right in step with today's construction and industrial needs is this fully modernized line of CMC equipment. There's new Concrete Mixers, Plaster and Mortar Mixers... Fastest Dual Prime Centrifugal Pumps... Radial Arm Saws... Hoists... Batchers... Concrete Guns... Generating Plants. A great line backed by an outstanding record of "know how" in building money-making equipment.

CONSTRUCTION MACHINERY CO.
WATERLOO, IOWA

RADIAL ARM SAWS

ELECTRIC GENERATING PLANTS

BIN BATCHERS

LEARN TO ESTIMATE

Today, more than ever before, you must know how to analyze building costs. If you want to become a successful builder, learn how to prepare a correct estimate in a hurry. Get in on the profitable work now available wherever you turn. Your success is assured if your estimates are right; otherwise you are licked before you start.

The Tamblin System of Estimating will make a real estimator out of you in a few weeks of your spare time. We are so sure that you will want to learn it, that we will send you our complete home study course for ten days examination absolutely free. If you don't think it is the finest thing you ever saw, just return it and it won't cost you a cent. If you like it and want it, send us five dollars a month until you have paid the total price of only thirty dollars.

This estimating system is based on forty years of actual construction experience. It has been sold all over the world for more than twenty years. Thousands of estimators and contractors swear by it. Our offer isn't hot air and big talk. We don't give you a diploma or a lapel button, but we do teach you down to earth estimating which will bring you profitable business.

Just send us your name and address today, and we will mail you the complete course at once for your approval.

TAMBLIN SYSTEM

210 Johnson Bldg., CE,
Denver 2, Colo.

ASK FOR BULLETINS ON LINES YOU ARE INTERESTED IN!

County Roadmaster Battles Fine, Dry Soils

Powder-Dry Soils in This County Pose Serious Dust Problem; Care of Roads; Safety Record

† ALL the dust-bowl counties are not located in Kansas. One of the most arid regions in the United States, from the point of view of a county highway engineer, is Deschutes County, Oreg. Deschutes (rhymes with "he shoots") County is on the dry side of the Cascade Mountain Range, and County Roadmaster George H. McAllister has been engaged for the past twenty years in a battle with unusually dry, fine soil, which gets a norm of only 12 inches of rainfall a year.

Along about the middle of August each year, when county engineers over most of the rest of the country are farming out a few mowers and otherwise taking it easy, McAllister is having the climax of labor pains induced by this soil condition. Out of about 1,050 miles of county road, more than half are showing, by August, several inches of dry, powdery dust. Two years back, when the Army picked Deschutes County for the center of extensive maneuvers involving 75,000 vehicles, the dust got so thick it splashed off to the side of the road, like water in the wake of a fast motorboat.

"Why didn't they sprinkle the roads?" you might ask at this point.

They did. And sprinkling Deschutes County roads is about the worst thing to do. Water settles the dust and causes the ground to swell. Then the minute sprinkling stops, the soil is all loose with its pores open, so to speak, and the dust problem is more serious in a matter of hours than it ever was before. The Army brought sprinkler trucks in by the hundred, more or less, and finally settled its part of the deal by issuing respirators to all hands.

The Army has long since quit Deschutes County, but the ravages of its heavy vehicles still remain with Roadmaster McAllister, who has just about caught up with the problem. By the very nature of the topography and industry in the region, Deschutes County roads get a consistent beating from heavy vehicles. Heavy trucks, tractors, and trailers traverse county roads to haul ranch and farm produce to the cities. All the work in connection with the famous Deschutes Irrigation Project was done near here, and farms are now growing crops where none ever grew before. Ranchers in the eastern half of the county transport their steers to market on rubber tires. All of this adds up to wear and tear on the road system.

Since the county is on the eastern slope of the Cascades, it is mostly high and mountainous. The lowest elevation of any county road is 2,250 feet above sea level. Several hundred miles are above elevation 4,200, and some county roads reach better than a mile high. Temperatures vary from 95 degrees in summer to sub-zero marks in winter. Rain is conspicuous by its absence; when it does occur, editors of all the little weekly newspapers give it front-page coverage.

County Organization

The Road Department, run by McAllister, is governed by the County Court: Judge C. L. Allen and Commissioners E. E. Varco and A. E. Stevens. The Court believes a road department should build and maintain roads within a budget. Nothing else. No politics, no backslapping, no apple-polishing, no palm-greasing. Out of an annual operating budget which is never over

\$75,000, the Court appropriates a sum for salaries. Though it holds McAllister accountable for not exceeding that figure, it gives him a free hand in hiring and firing his help. As a result, two men have been in the county service longer than McAllister, and many have more than eight or ten years of service. Once having located a good man, McAllister believes in keeping him.

McAllister controls maintenance of roads and the assigning of maintenance equipment, in cooperation with Judge Allen and the two commissioners. Under him work a bridge foreman and a construction foreman. McAllister shuffles a steady crew of fifteen men around to meet any situation, and the men work on many phases of the county system.

Funds for the budget come from automobile registration and gasoline taxes, amounting to about \$50,000 a year. The Forest Service pays an average of about \$15,000 per annum in lieu of taxes, and the remainder of the money comes from fines and miscellaneous receipts. Seldom has Deschutes County levied a road tax, and the few times it has, it amounted to only one mill per \$100 assessed valuation. Because of this freedom from taxation, McAllister enjoys an unusually nice situation so far as the public is concerned.

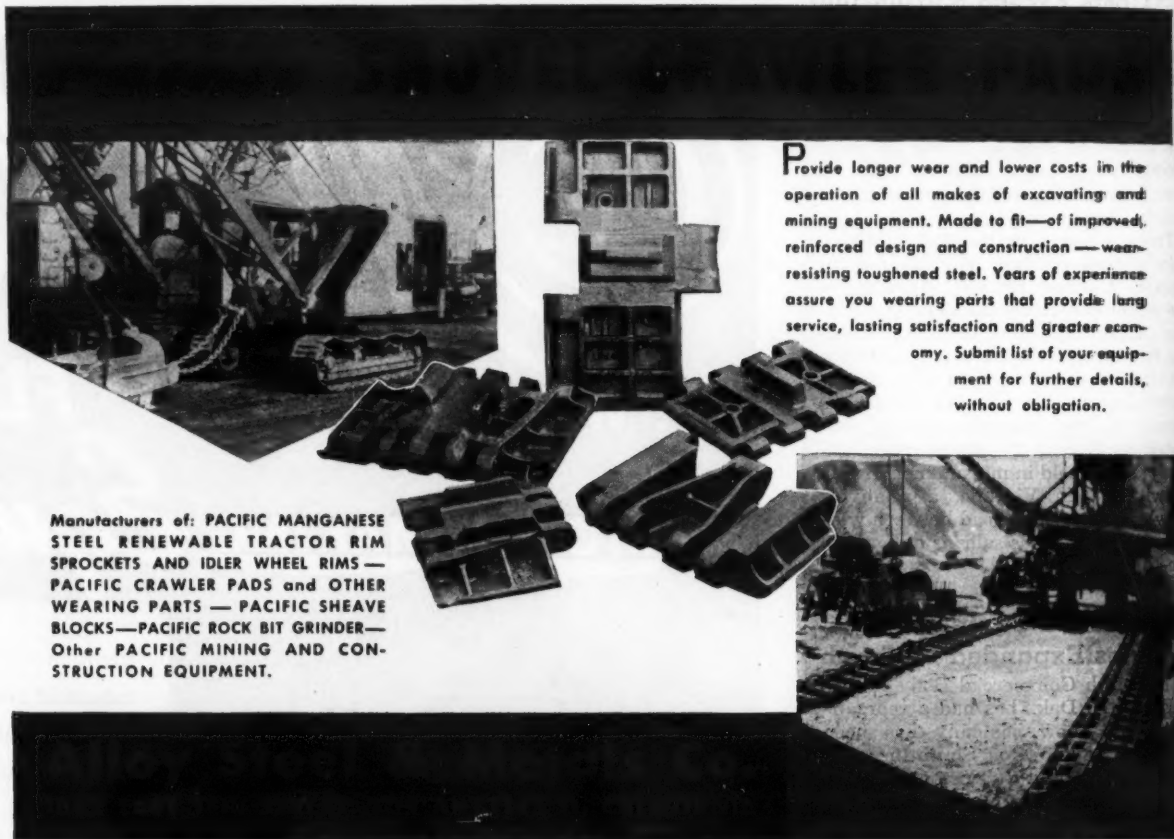
Of course, there never was a county engineer who did not, at some time in his career, wish that he could tell John Q. Public where to go. But McAllister is far too cultured a person to resort to that kind of language. Nowadays when the inevitable pompous citizen bursts into his office shouting, "I'm a taxpayer and I demand . . .", McAllister soothes him with, "You're not a taxpayer and you have no right to demand." Then he shows the guy the statutes, asks him

what part of the county road system is troubling him, and makes his word good on whatever help he can promise.

He has authority to make open-market purchases of repair parts, small tools, or material, and always gets clearance from the County Court on major items. Recently, for instance, the County got delivery on a new Bay City ½-yard shovel which had been on order since August, 1945. He keeps in close contact with all the sources of supply for items he needs in his road program—items that have been getting scarcer as the months pass.

The Maintenance Program

Since so little new construction can be done on Deschutes County's limited budget, the next best thing is the improvement of roads now built. Participation of the State and Public Roads Administration in the secondary-road program will benefit Deschutes County by 43 miles of hard-surfaced highways (Continued on next page)



Provide longer wear and lower costs in the operation of all makes of excavating and mining equipment. Made to fit—of improved, reinforced design and construction—wear-resisting toughened steel. Years of experience assure you wearing parts that provide long service, lasting satisfaction and greater economy. Submit list of your equipment for further details, without obligation.

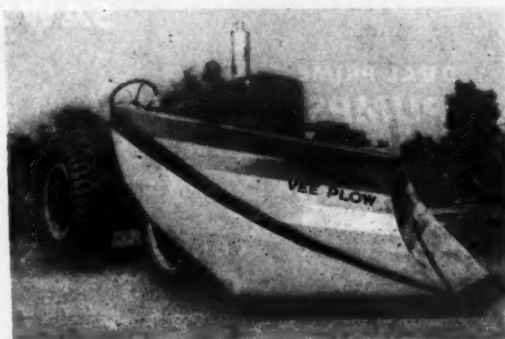
Manufacturers of: PACIFIC MANGANESE STEEL RENEWABLE TRACTOR RIM SPROCKETS AND IDLER WHEEL RIMS—PACIFIC CRAWLER PADS and OTHER WEARING PARTS—PACIFIC SHEAVE BLOCKS—PACIFIC ROCK BIT GRINDER—Other PACIFIC MINING AND CONSTRUCTION EQUIPMENT.

TROJAN

COMBINATION BULLDOZER AND SNOW PLOW

for

International Industrial Wheel Type Tractor



This efficient earth mover can also be used for snow removal. The bulldozer blade and V type or reversible blade snow plows are interchangeable.

The one control valve provides easy operation and the parallel blade lift and full axle clearance are Trojan features.

These attachments have been designed for use on International I-4, I-6 and I-9 Wheel Tractors.

See your International Industrial Distributor for complete specifications.

CONTRACTORS MACHINERY CO. INC.
Dept. CE-71
Batavia, N. Y.



C. & E. M. Photo
County Roadmaster George H. McAllister stands by the cab of a Bay City 1/4-cubic-yard shovel, newest addition to the Deschutes County list.

County Roadmaster Battles Fine, Dry Soils

(Continued from preceding page)

it would not otherwise have. But the surfacing of some of these roads is only a part of the secret of dust control.

The roads center in a right-of-way 60 feet wide. They are graded with 4 to 1 back-slopes in earth, or 1 to 1 back-slopes in rock. Previously graded and drained, they have borne the brunt of traffic without surfacing. Other than that, they met the specifications for secondary roads.

On the top of established grades, McAllister's men are now spreading 4 inches of lava-flow cinders in a blanket 26 feet wide. This blanket is being rolled by hauling equipment, and a 20-foot-wide mat of crushed rock spread 2 inches thick on top of the cinders. After being smoothed up with one of four Caterpillar No. 12 motor graders owned by the County, this crushed rock is shot with 0.6 gallon per square yard of RC-6 or SC-6 cut-back asphalt. A thin coat of blotting rock from 1/4 to 3/4 inch in size is then applied not over an inch thick to give a non-skid surface.

The cinders and most of the crushed rock are available throughout Deschutes County, and the Bay City shovel loads this material into a fleet of eight dump trucks. The County does not own its crushing equipment, however, and surface rock for the blot coat is generally purchased from commercial aggregate companies closest to the job.

According to McAllister, this type of penetration treatment thoroughly whips the summer dust problem and is elastic enough to resist subgrade frost action in winter. Roads which have been surfaced this way show little deterioration from heavy truck loads. The occasional pothole which does show up is easily patched with the same material.

For patching hard-surfaced roads, a crew of four men, a dump truck, and an asphalt kettle are used. Two men clean and broom the low spots, and the other men fill the hole with crushed rock and apply RC-6 asphalt.

On the majority of graded roads, some of which have been topped with lava cinders or creek gravel, dust is still the worst problem of all. In March or April the Caterpillar motor graders go over every mile of these highways, grading the surface and side ditches. This is done after the snow has melted, but before the ground dries. The passage of vehicles causes a fairly hard crust to form, and if traffic is not too severe this earth crust will carry it for several months with a minimum of dust.

Unless it rains, which isn't likely be-

fore autumn, these graded roads are left to traffic until just before the late fall freeze-up. At that time they are gone over again, smoothed up, and drained, so that when the winter snows come, snow removal will not be hampered by frozen ruts and ridges.

The mower situation has been such that Deschutes County has had to use truck-drawn machines for such mowing as it has done. Even in this dry and arid county, where native grasses and shrubs grow only with difficulty, the maintenance of shoulders is a coming requirement for the up-to-date county road system. Deschutes County will meet that requirement as soon as power mowers are available. Right now a new bulldozer and some dump trucks are more important, although it has a Caterpillar D6 tractor with bulldozer blade and a LeTourneau 6-yard Carryall.

The Snow Problem

In the winter, when zero weather comes, the removal of snow from county

(Continued on next page)



Truk-Loder dumping dirt into hauling truck

HANDLES LOOSE DIRT QUICKLY

For highway construction and maintenance. Surplus berm and ditch dirt are quickly and economically loaded.

Hauling trucks can be loaded from either side or rear. Attaches to any standard dump truck whose hoist furnishes lifting power. One-man operation. Bucket has 1/2-cu. yd. capacity.

Write for prices and delivery.

TRUK-LODER COMPANY • Tiffin, Ohio



Fisher Bros. Construction Co., Farmington, Minn., using Tel-smith Dual Portable with standard truck-loader and field conveyor.

TELSMITH

Dual PORTABLE

CRUSHING - SCREENING - LOADING PLANTS

High Capacity

...with DEPENDABLE LOW COST OPERATION

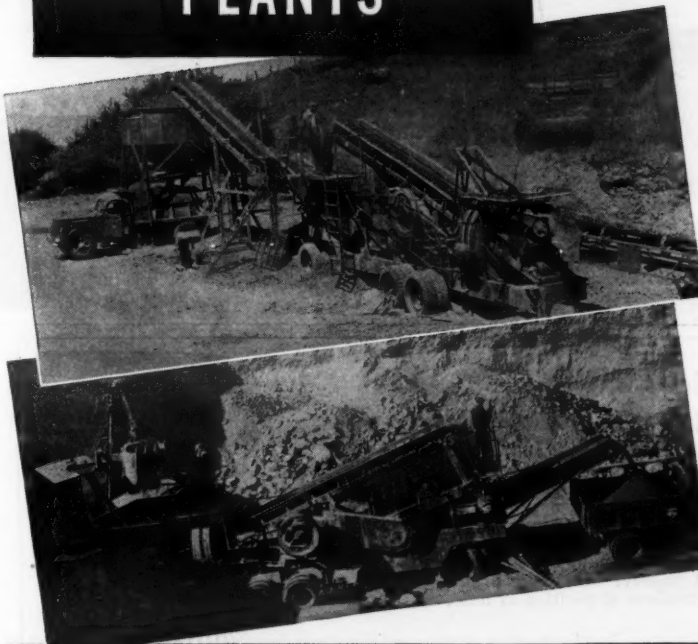
● Keep your trucks rolling... speeding aggregate to that road job of yours... with a Tel-smith Dual Portable Crushing-Screening-Loading Plant.

Dependability is built-in—with the same Tel-smith standard units that go into commercial stationary quarry or gravel plants.

The jaw crusher with the cast steel frame, an outstanding Tel-smith feature... the double roll crusher... the big 2 1/2-deck vibrating screen—every Tel-smith unit is soundly designed and built to operate with equally high efficiency. That's your assurance of high capacity, dependability, and low cost operation.

This one-man-operated, quickly moved, easily set up Tel-smith portable outfit may be had in any one of the three styles of plants illustrated; and with any one of three types of drives—flat belt... V-rope with direct connected coupling... engine mounted on plant, with V-rope drive. Get Bulletin P-34.

P-13



Left, top: A Bin-loading Tel-smith Dual Portable with field conveyor, owned by Colonial Construction Co., Spokane, Wash.

Left, bottom: Truck-loading Tel-smith Dual Portable with shovel loading hopper on end of plant; no field conveyor. Owned by Braun Construction Co., Fond du Lac, Wisconsin.

SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE 12, WISCONSIN

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Borchert-Ingersoll, Inc.
St. Paul 4 & Duluth 2, Minn.
Mines Eng. & Ept. Co.
San Francisco 4—Los Angeles 14

County Roadmaster Battles Fine, Dry Soils

(Continued from preceding page)

highways is a headache. The county is frequently lashed by winds. Comparatively light snows blow and drift in highway cuts, sometimes more than 5 feet high. The county-owned four-wheel-drive trucks are then rigged with V-plows, and push plows are installed on smaller trucks. Snow, discouraging as its removal can be, is met with the same energy as are other highway problems. When storms are unusually severe and rotary equipment is needed, the County simply has to use a bulldozer. For all rotary equipment is state-owned and busy on state highways. It is not considered economical to tie county funds up in one-purpose snow-fighting machines, and the boys make out the best they can with V-plows and bulldozers when the drifts pile up.

Last year during a convention of engineers, the subject of snow removal came up. One county engineer from Idaho explained that he saved wear and tear on truck plows by hitting bad drifts with the truck clutch depressed and the throttle cut off. If the truck failed to make it, the operator just backed up for another try. He turned to McAllister and asked if he didn't agree that this was the best way to clear stubborn drifts.

"In Deschutes County," McAllister replied, "the truck goes ahead until it's stuck. Then the operator backs up about 100 yards, hits the drift by plunging the truck ahead wide open, clutch engaged, geared down to 'grandma'. He has a prayer on his lips, and I think he might even be pushing a little on the steering wheel to give body English and moral support!"

Whether or not this is the best way, it's effective. V-plows clear snows up to 4 feet high; beyond that the bulldozer helps by pushing bad drifts off into some rancher's field.

Care of Equipment

By centering the authority on machines and equipment in the Roadmaster, Deschutes County services roads over an area of 2,500 square miles with about half the outlay which certainly would be required if the county were divided into districts. "Monkey wrench" repairs are made in the field or in the county garage in Bend. But one of the reasons for the standardization of equipment with Caterpillar power has been the repair and service facilities of the Reed Tractor & Equipment Co. of Klamath Falls, Oreg. Major repairs requiring special tools are made by one of Reed's servicemen, helped by one or two Deschutes County men whom McAllister assigns to the job.

"This equipment company at Klamath Falls sends out two mechanics for every salesman," McAllister said. "When a piece of equipment comes in new there's a man here to check it thoroughly. Two weeks later he's back to check it again.

It's a pleasure to tell you about this kind of service." Incidentally, that kind of service from private enterprise is making things more economical for Deschutes County, which is getting an A-1 job on repairs without the normal outlay of tools.

One of these days, Deschutes County

hopes to build a new county garage, loading ramp, gasoline station, and storage shed on a 2-acre plot.

Bridges

Due to heavy trucks carrying livestock and produce out of Deschutes County, requirements for bridges are

modeled after specifications of the State Highway Department for H-15 loading. Deschutes County bridges carry 54,000-pound loads on 16-foot spans, with a safety factor of about 2. The bridges are built on concrete piers, with 6 x 20-inch fir stringers laid narrow side up and

(Concluded on next page)



Why must secondary roads be "Stepchildren"?

Get to them sooner—open them faster with WALTER SNOW FIGHTERS

SECONDARY ROADS are often neglected because main highways tie up equipment too long. The delay makes snow conditions worse and imposes serious hardships on rural dwellers.

Here, again, highway departments equipped with Walter Snow Fighters enjoy a big advantage. Because these fast, powerful Walter units clear main highways much quicker (20-30 m.p.h.)—you get to secondary roads much sooner. before drifting, packing and freezing can complicate the job. No matter what conditions you find, Walter Snow Fighters will blast through in record time.

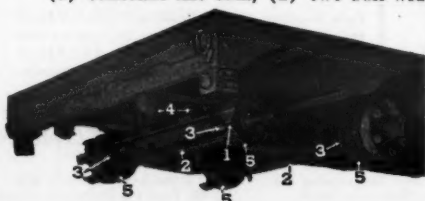
This faster clearing of Walter Snow Fighters comes from the great power and 100% traction supplied by the exclusive Four-Point Positive Drive. This provides maximum plowing speeds in pouring snow, opening drifts or travelling icy surfaces. There is no side-slipping, no stalling, no wheel spinning. Available in models from 125 hp. to 350 hp., with every type of equipment, to bring any snow conditions speedily under control. See your Walter distributor or write us for detailed literature.



WALTER SNOW FIGHTERS

BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES

Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.



C. R. JAHN COMPANY

1347 W. 37th Place, Chicago 9, Ill.
Heavy duty trailers from 5 to 100 tons.



Show You Care thru CARE

Speed food to famine stricken countries in Europe. Net weight of food is approximately 29 lbs. Food is already cooked and easily prepared. Vithy needed supplies also in every package. CARE takes care of everything—package, shipping, insurance and guaranteed delivery—total cost \$10.

Send BOTH remittance application and check or money order to CARE, 50 Broadway Street, New York 4, N. Y.

County Roadmaster Battles Fine, Dry Soils

(Continued from preceding page)

spaced on 18-inch centers. On a few bridges where spans reach up to 20 feet in crossing a narrow stream, a single span is used with stringer centers narrowed to meet 54,000-pound loading. Decking is 4-inch material, and heavy guard-rails are secured with 3/4-inch bolts. It takes a sizable wreck to require repair work on a Deschutes County bridge.

Almost all of Deschutes County bridges and culverts cross irrigation streams or carry irrigation water. Drainage and surface water, well known to many county engineers as their No. 1 headache, are nonexistent problems here. Once in a while in the late autumn, high winds blow tumbleweeds into the mouth of a Deschutes County culvert, and plug it. These instances are so few, however, that they cannot be classed as serious.

The Human Side of Maintenance

Safety. A little word, but one with a lot of humanitarianism to it. In Deschutes County, safety is practiced constantly by men who use practical judgment, without making a great show of the thing to hold their jobs securely. The two foremen each day make certain that hazards do not exist. They see to it that men and equipment are protected by Scotchlite signs, and by flagmen if necessary. They correct a hundred conditions every day. But no hard and fast rules can be enumerated here. In the same sense that you cannot learn the Australian crawl without venturing in the water, you cannot learn safety out of a book. The best safety device is a careful workman.

And here are the results: the State Industrial Accident Commission, which carries Deschutes County accident insurance, has reduced its normal rate 50 per cent. The County pays the lowest rate offered by the Accident Commission. Not once in many years have the county workers suffered any accident more serious than a cut finger, or a scratch. Such records don't just happen.

McAllister's men also carry protection with the Oregon Physicians' Service, voluntarily. For a \$2.50 monthly fee, a wide selection of Oregon doctors will care for a man if he is sick, disabled, or hospitalized. This fee covers a case of acute appendicitis as well as other such emergency operations. The men think it's excellent protection, and they buy it.

But the biggest problem in Deschutes County is still the dust.

New-Type Electrodes

High-carbon electrodes for building up worn steel parts by welding with low-voltage ac transformers, as well as dc, are announced by The Lincoln Electric Co. The new electrodes are designated Hardweld 50 ac and Hardweld 100 ac, to distinguish them from the regular Hardweld line which operates only on dc. They have a heavy extruded shielded-arc-type coating, they produce flat smooth heads, and the deposits can be hot-forged, says the manufacturer. Hardweld 100 ac has a hardness of deposit on straight carbon steel, when allowed to cool naturally, of 20 to 45 Rockwell C; Hardweld 50 ac has a hardness of 20 to 35 Rockwell C. Hardweld 100 ac comes in 1/8, 5/32, 3/16, and 1/4-inch sizes; Hardweld 50 ac in 3/16 and 1/4-inch sizes.

Lincoln also announces the addition to its line of a new electrode designed to simplify the welding of high-sulphur free-machining steel and of certain high-tensile low-alloy steels. Known as Shield-Arc LH-70, it has a low-hydrogen low-moisture coating and is de-

signed for use with dc polarity. Welding currents used are high in comparison to other all-position-type electrodes. It comes in 1/8, 5/32, and 3/16-inch sizes.

For complete details on these new developments in the welding field, write to the company at P. O. Box 5758, Cleveland 1, Ohio.

Soil-Compaction Bulletin

The American Road Builders' Association has made available a report by O. J. Porter entitled, "The Use of Heavy Equipment for Obtaining Maximum Compaction of Soils". Mr. Porter was one of the pioneer advocates of densifying soils to their utmost for the purpose of developing their stability to a high degree. His work has won him recognition as an expert on foundations for heavy-duty airports, highways, bridges, and buildings.

The report reviews the history of earth compaction from the sheepfoot tamper of 1904 to the 200-ton rubber-tire rollers of today. Mr. Porter goes

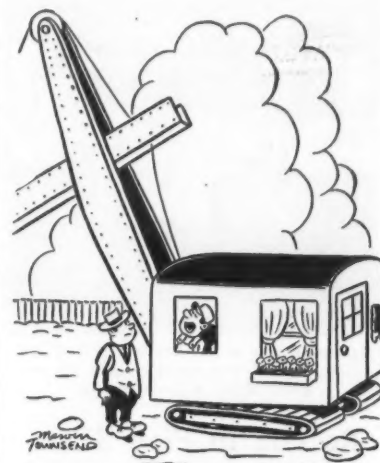
into considerable detail regarding test methods and principles of soil compaction. He advocates compacting in thin layers, using heavy equipment, and employing higher than usual tests in the determination of density requirements.

The booklet also contains a report by Gregory P. Tschibotarioff of Princeton University on "Vibratory and Impact Compaction of Soils". Copies of technical bulletin No. 109, 1946, can be obtained by writing to the Association at 1319 F St., N. W., Washington 4, D. C.

Contractors' Air Tools

A complete line of air tools for contractors' use is described in a new catalog issued by the Ingersoll-Rand Co. This 24-page flier gives you complete details and photographs of the various pieces of equipment and their applications. The booklet is indexed for ease in locating the right tool for the right job. The last page is devoted to a list of all the Ingersoll-Rand dealers.

Copies of this flier may be obtained



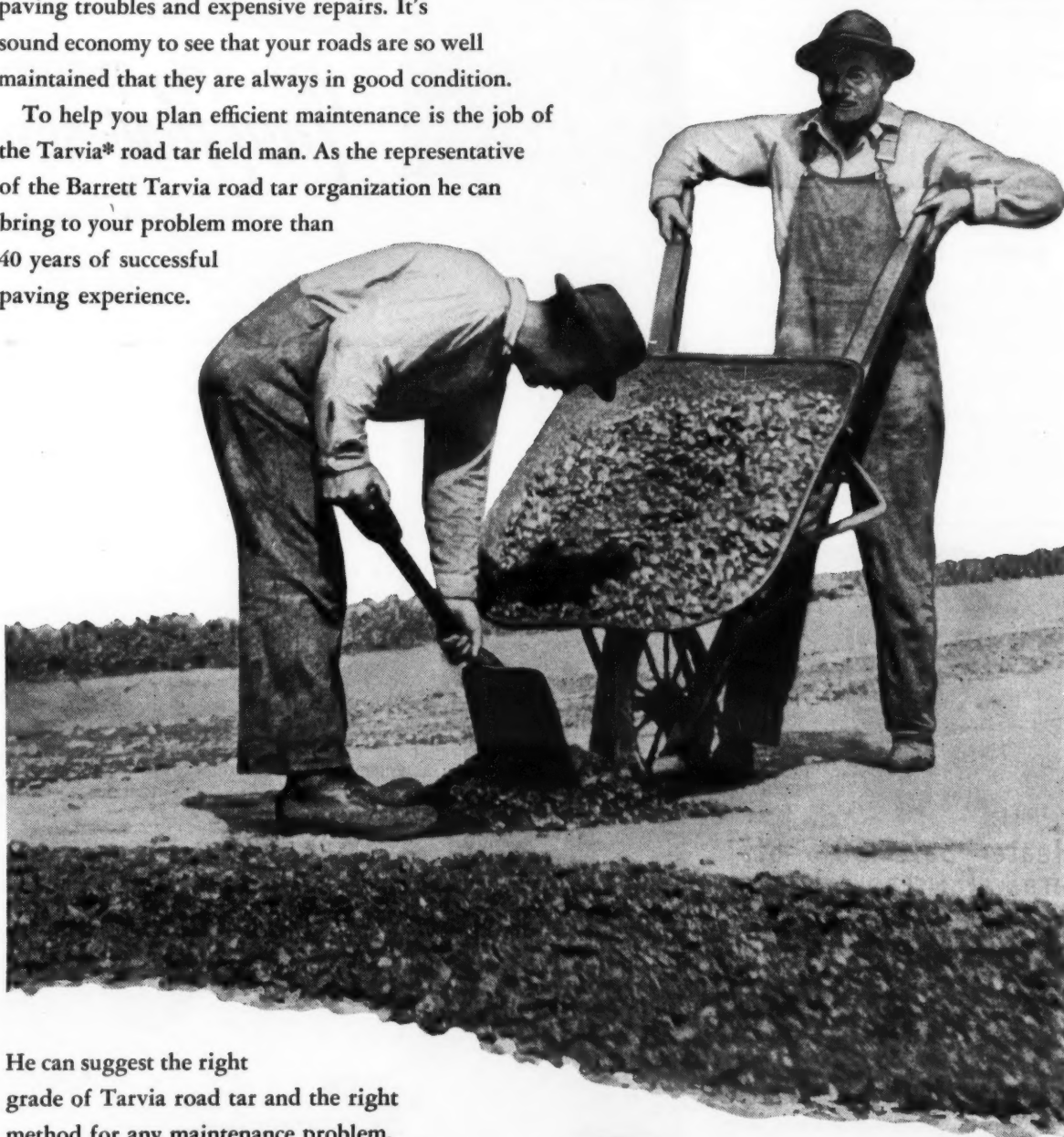
"You can fire me, but it'll take an O.P.A. eviction to get me out!"

by writing to the manufacturer, 11 Broadway, New York 4, N. Y., and requesting Form 5600 as described in CONTRACTORS AND ENGINEERS MONTHLY.

Regular seasonal inspection and attention to small surface defects can often prevent serious paving troubles and expensive repairs. It's sound economy to see that your roads are so well maintained that they are always in good condition.

To help you plan efficient maintenance is the job of the Tarvia® road tar field man. As the representative of the Barrett Tarvia road tar organization he can bring to your problem more than 40 years of successful paving experience.

HOW TO KEEP A ROAD HEALTHY



He can suggest the right grade of Tarvia road tar and the right method for any maintenance problem.

Why not check with him today? Plan now to put your roads in healthy condition . . . and to keep them that way.

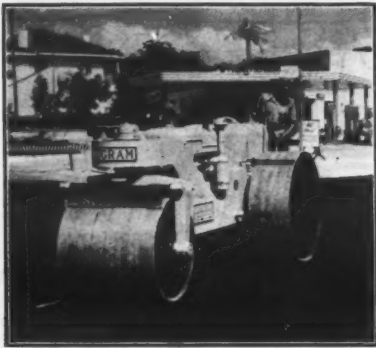
"THE LONGEST MILE," a 30 minute, full-color, sound film on the development and importance of roads will soon be available for showing to highway officials, engineers and civic groups. Ask the Tarvia road tar field man for it, or write the nearest Barrett Tarvia road tar office.



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Pictured here is the Ingram 5 to 6-ton roller, one of five models made by the Acme Wire & Iron Works.

Rollers in Five Sizes

Rollers in five sizes, ranging from 4 to 12 tons, are described in a series of leaflets put out by the Acme Wire & Iron Works. The line forms the basis of the firm's slogan, "an Ingram for every type of job".

The 5 to 6-ton model has five speeds forward and five reverse, ranging up to 12 mph. It is powered by an International 32-hp water-cooled gasoline engine. Like all Ingram rollers, it has a rear platform with a swivel seat, designed to provide unobstructed visibility for the operator.

The other four models in the Ingram line are a 4 to 5-ton model, 6 to 8-ton, standard 10-ton, and the standard 12-ton.

Complete information and specifications are available for the asking from the manufacturer, at 1343 W. Laurel St., San Antonio, Texas. Please mention this item.

Buffing Dust Collected

Suggestions for installing individual collectors of dust and lint from polishing and buffing operations are contained in Bulletin 392 available from the Agat-Detroit Co., 602 First National Bldg., Ann Arbor, Mich.

A new addition to the company's Dustkop line is the Model 1150. It is a self-contained recirculating-type dust collector with storage and suction ca-

capacity said to be sufficient for heavy-duty woodworking operations. It can also remove large volumes of collected dust, the manufacturer says.

The unit requires 8 square feet of floor space. It is rated at 1,400 cfm on a single 6-inch inlet, and will develop a static suction ranging up to 7.9 inches of water on a single 4-inch inlet. Its dust-storage capacity is 66 gallons.

Further details about the Dustkop line, and copies of Bulletin 392, can be obtained by writing to the manufacturer. Please mention this item.

Hard-Facing Guidebook

A practical hard-facing guidebook has just come off the press and is being distributed free of charge by the Stoodly Co., 1136 W. Slauson Ave., Whittier, Calif. The new 48-page book is arranged in eight sections according to eight industries; each section covers the chief uses of hard-facing alloys in the industry concerned.

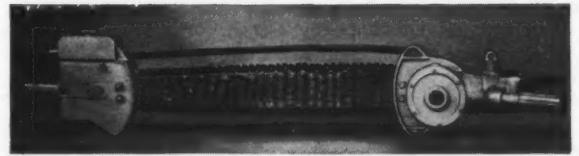
Section 1, on the construction indus-

try, covers tractors, bulldozers, scrapers, graders, ditchers, power shovels, and so on. Section 2, on rock parts, covers crusher jaws, elevator-bucket lips, sizing screens, etc. Section 7 covers the dredging business. Each section is arranged in a 5-column table to in-

clude: the name of the part, the type of rod and amount required, hard-facing procedure, benefits of hard-facing, and explanatory drawings.

Write to Stoodly for a copy of the guidebook, mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Investigate this modern power tool



For clearing and cutting timbers, and topping piles with speed and accuracy, this modern power tool is just what you need—especially designed to meet post-war construction requirements. Pneumatic model illustrated weighs only 46 lbs. Gas and electric models also. Local demonstrations available in most areas.

LOMBARD CHAIN SAWS

Mfg'd by Lombard Governor Corp.,

100 Main St., Ashland, Mass.

IT'S DIFFERENT!
IT'S DURABLE!
IT'S EFFICIENT!
IT'S LIGHT!
IT'S NEW!

THE NEW REX *Easy Flow* SPEED PRIME PUMP with the Press-Formed Body

Light weight . . . outstanding durability . . . top efficiency, the new Rex "Easy Flow" Pump gives you all three *and then some*. The Rex pump body is press-formed of Armco Metal . . . the metal that is known for its long life under severe conditions of rust and corrosion. This new pump body won't crack or shatter under heavy blows . . . or in freezing weather.

The Rex "Easy-Flow" Pump is the fastest priming, most efficient pump in the field today. The press-formed steel body and volute have infinitely smoother surfaces, assuring a faster flow of water through the pump. There is no recirculating shut-off valve, eliminating wasteful recirculation.

Combine all these features plus the famous Rex adjustable Z-Metal Peeler and Z-Metal Impeller, and it's easy to see why you'll get a new high in long service life.

For all the facts, see your Rex Distributor or write for your copy of Bulletin No. 46-23. Chain Belt Company, 1666 West Bruce Street, Milwaukee 4, Wis.



CHAIN BELT COMPANY OF MILWAUKEE
CONSTRUCTION MACHINERY



PUMPS



PAVERS



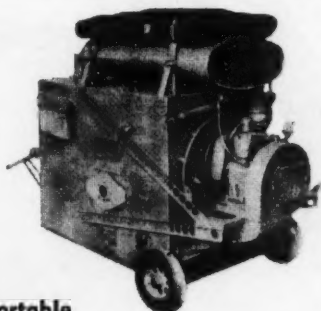
PUMPCRETES



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Heater Sale—50% off

HERMAN NELSON powerful 250,000 BTU Portable Heaters (gasoline-burning) complete with blower, air-cooled engine, collapsible ducts, portable mounting. No smoke; no soot; no open fire. Self-powered, self-contained. Cuts Winter's delays; improves efficiency.

HEATING buildings, shops, sheds, warehouses, buildings under construction, etc.

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DRYING concrete, plaster, paint, mortar, lumber, other materials.

SPOT-HEATING men, materials, machinery, equipment, storage tanks, etc.

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ORIGINAL COST Over \$660.00
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SALE PRICE \$330.00

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All units completely rebuilt and positively guaranteed.

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Study Waterproofing Mortar and Concrete

Dr. C. W. Borgmann of the Engineering Experimental Station of the University of Colorado has announced that a research project for the study of waterproofing mortar and concrete through the use of petroleum derivatives has been established by The Texas Co.

According to Professor Warren Raeder, Head of the Department of Civil Engineering at the University of Colorado, it is suspected from published work that even small amounts of asphalt and related petroleum derivatives may greatly increase the water resistance and flexibility of the resulting concrete structure. Already it is known that petroleum materials increase the amount of air that can be incorporated in the concrete mix. This entrained air increases the resistance of concrete to freezing and thawing and thus makes it more durable, he says.

Professors Raeder and William H.

Thoman will supervise the project, assisted by D. G. Kretsinger, Associate Research Engineer of the Experiment Station. Several graduate students in civil and architectural engineering will work with Mr. Kretsinger.

Lehti Elected President, Link-Belt Speeder Corp.

The Link-Belt Speeder Corp., Cedar Rapids and Chicago, announces the election of David W. Lehti as President, effective January 1. He succeeds Troy M. Deal, who retires on March 1, 1947.

Mr. Lehti first became associated with the company as a distributor in 1925. He joined the Speeder Machinery Corp. in 1934. Upon the consolidation of that firm and the Shovel & Crane Division of Link-Belt Co. in 1939, he was promoted to Assistant General Manager of the newly formed Link-Belt Speeder Corp. at Cedar Rapids. He was elected Vice President in 1942.

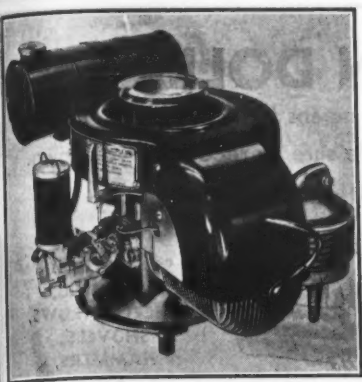
Mr. Deal, who is retiring, has been President since 1939.

Proceedings of Highway Research Board Published

The Proceedings of the 25th Annual Meeting of the Highway Research Board have been published and are now available. The book, in stiff binding, has been edited by Roy W. Crum, Director of the Highway Research Board, and Fred Burggraf, Associate Director.

The reports presented to the Board are printed in their entirety and are divided into the following groups: design, materials and construction, maintenance, traffic and operations, soils investigations, and special projects. There is an author index, and lists of member organizations, state contact men, etc., are included. The minutes of the January, 1946, business meeting constitute an appendix as well as general and miscellaneous information.

Copies of the book may be obtained by writing to the Highway Research Board, The National Research Council, 2101 Constitution Ave., Washington, D.C. The cost of the book is \$5.00.



This 24-pound McCulloch gasoline engine is rated 2.5 hp at 2,500 rpm.

Lightweight Engine

A new type of lightweight industrial gasoline engine is now being produced by McCulloch Motors Corp. The engine weighs 24 pounds. It is a single-cylinder 2-cycle air-cooled type which develops a rated 2.5 hp at 2,500 rpm.

It features the McCulloch patented "reverse-flow" scavenging system which permits the use of flat-top non-deflection pistons. Directional control of the incoming fuel charge is achieved through the use of guide vanes in the intake ports, not through piston-top deflection. It is claimed that detonation resulting from hot spots on piston tops is greatly reduced. The angled intake ports control and focus the intake fuel flow.

The engine has a vertical crankshaft, and all bearings are of the antifriction type. The engine has a high-tension flywheel magneto and a rope starter. Bore and stroke are 2 x 2 inches; displacement is 6.28 cubic inches; overall height is 14.6 inches; length is 17.8 inches; and width is 14.2 inches. The reduced weight is achieved by the use of high-pressure high-strength aluminum-alloy die castings.

Complete details of the Model 1200D are obtainable by writing to the maker at 6101 W. Century Blvd., Los Angeles 45, Calif. Please mention having read this news item in CONTRACTORS AND ENGINEERS MONTHLY.

Sales Force Expanded

To help extend its sales service to users of electric arc welding, The Lincoln Electric Co. of Cleveland, Ohio, has announced the addition of seven men to its sales department. Marvin Anderson has been assigned to the Moline, Ill., office; Albert Bavaria to the Philadelphia office; Richard Freundlich to Cleveland; Paul Holden to Franklin, Pa.; Richard Nelson and John E. Williams to Syracuse; and Richard K. Reynolds will serve in the Detroit office.

The company has also recently named R. W. Sharp as District Manager and Sales Engineer of its new Indianapolis office, which has been established at 343 Central Ave.

The new manager returns to Lincoln Electric after three years' service in the Navy as a welding engineer at both east and west-coast yards. Mr. Sharp has been with the company since 1939, and was covering the Kentucky and southern Indiana territory prior to joining the Navy.

VULCAN TOOLS

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

Vulcan Tool Manufacturing Co.

35-43 Liberty Street, Quincy 7, Mass.

Branch Offices and Warehouse Stocks:

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"99-H"

THE POWER GRADER THAT HAS EVERYTHING!

No Motor Grader without All-Wheel Drive and All-Wheel Steer can hope to equal the all-around operating efficiency of an Austin-Western "99" Power Grader. This was true of the "99" and "99-M." It is even more true of the "99-H" with its exclusive All-Wheel Drive and All-Wheel Steer, PLUS High-Lift Blade, Extreme Blade Reach and Completely Reversible Blade.

Your nearby Austin-Western distributor will be glad to tell you the whole story of "The Power Grader That Has Everything."

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.



ALL-WHEEL DRIVE

provides tremendous earth-moving ability under all ground conditions. The entire weight of the machine is on driving wheels.



ALL-WHEEL STEER

speeds up and simplifies every job; makes it easy for the "99-H" to do things that are impossible for ordinary motor graders.

PLUS



COMPLETELY REVERSIBLE BLADE

All-Wheel Steer greatly simplifies grading in reverse, by providing perfect steering control of both ends of the machine.



HIGH LIFT BLADE

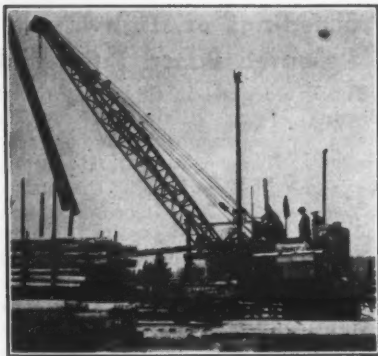
All-Wheel Drive and All-Wheel Steer make it possible for the "99-H" to do a superlative job of sloping banks, from the flattest to the steepest.



EXTREME BLADE REACH

Rear Steer makes it possible to reach 10 feet, 3 inches beyond the rear tire—a figure not even approached by any other grader.

BUILDERS OF **Austin Western** SINCE 1889



By replacing the steam boiler on this self-propelled Brown hoisting machine with a GM diesel engine, Valentine Clark Corp. has reduced fire risk and costs on a job at Newport, Wash.

Shift to Diesel Has Cut Fire Risk, Costs

By replacing the steam boiler on a self-propelled Brown hoisting machine with a diesel engine, the Valentine Clark Corp. of Minneapolis has reduced a dangerous fire hazard. It uses the machine at Newport, Wash., to dip peeled poles in a protective solution and to load them on flatcars. Sparks from the steam boiler were a menace to poles stacked in the yard.

The original 5 x 9-foot steam boiler, which operated on 110-pound pressure, has been replaced by a General Motors Series 71 4-cylinder diesel engine, rated 99 maximum bhp at 1,600 rpm. Its fire-safe exhaust feature is said to have cut the fire risk, as well as the cost of a boiler tender.

The Brown machine, used also as a locomotive in moving flatcars about the yard, has a capacity at 16-foot radius of 24,100 pounds. A Brown Lipe transmission coupled to the engine is geared with three forward speeds and one reverse. The hoist has a 360-degree turning radius.

Pipe-Measuring Gage

A gage which will measure pipe ranging from 1/8 inch to 12 inches in size is made by the Three-Point Gage Co. The device is so calibrated that when placed against the outside of a piece of pipe or conduit it registers the inside-diameter size.

The Three-Point Pipe Gage will measure pipe in any position, the manufacturer says, even against the wall. In dark places, it can be placed against the pipe, then carried to the light and read. In operation, the outer contour of the pipe is placed against two fixed contacts on the gage. A third contact is then moved into position against the pipe and the reading is taken. In addition to showing the diameter of the pipe, it also shows the drill size for tapping.

The gage is 2 3/4 x 4 1/4 inches when closed, weighs 2 ounces, has a leather carrying case, and will fit into a man's shirt pocket. It has a black electric rustproof finish with etched numerals which are filled in with white enamel.

Further information may be obtained by writing to the manufacturer at 3767 No. Racine Ave., Chicago 13, Ill. Mention having seen this report in CONTRACTORS AND ENGINEERS MONTHLY.

Metal-Lathe Tools

A line of broad-nose tools for turning cast-iron rolls has been developed by Kennametal, Inc., Latrobe, Pa. The roll-turning tools comprise Kennametal Grade K6 blades, held in position on an accurate surface of the supporting shank by a clamp and serrated advanceable back-up plate. The blade has four cutting edges that may be used in succession before any sharpening is required. The tools are available in four standard cutting widths: 4, 6, 8, and 10-inch.

Announced at the same time is a line of Kennametal-tipped tool bits for use

in knee attachments of turret lathes. These bits are available for machining steel, cast iron, and non-ferrous metals, in sizes 1/2 inch square x 3 1/2 inches long, 3/8 x 4, and 1/4 x 4 1/2.

Shop superintendents may obtain complete information by writing to the company at 700 Lloyd Ave. Please mention this item.

Staff Changes for I-H

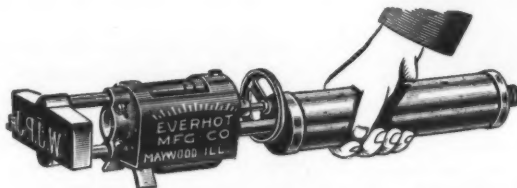
International Harvester Co. has announced that Monroe Rooks, former Manager of the motor-truck branch at New Orleans, has been transferred to the Birmingham general-line branch in the same capacity. Mr. Rooks will replace P. H. Baker, former Manager at Birmingham, who will establish his own dealership at Macon, Ga., handling International Harvester equipment.

R. E. Solberg, former Assistant Manager of the order and distribution department, has resigned to engage as an International Harvester dealer at Elk Point, S. Dak.

540 MILLION DOLLARS

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Don't let someone else set up in business with your tools.

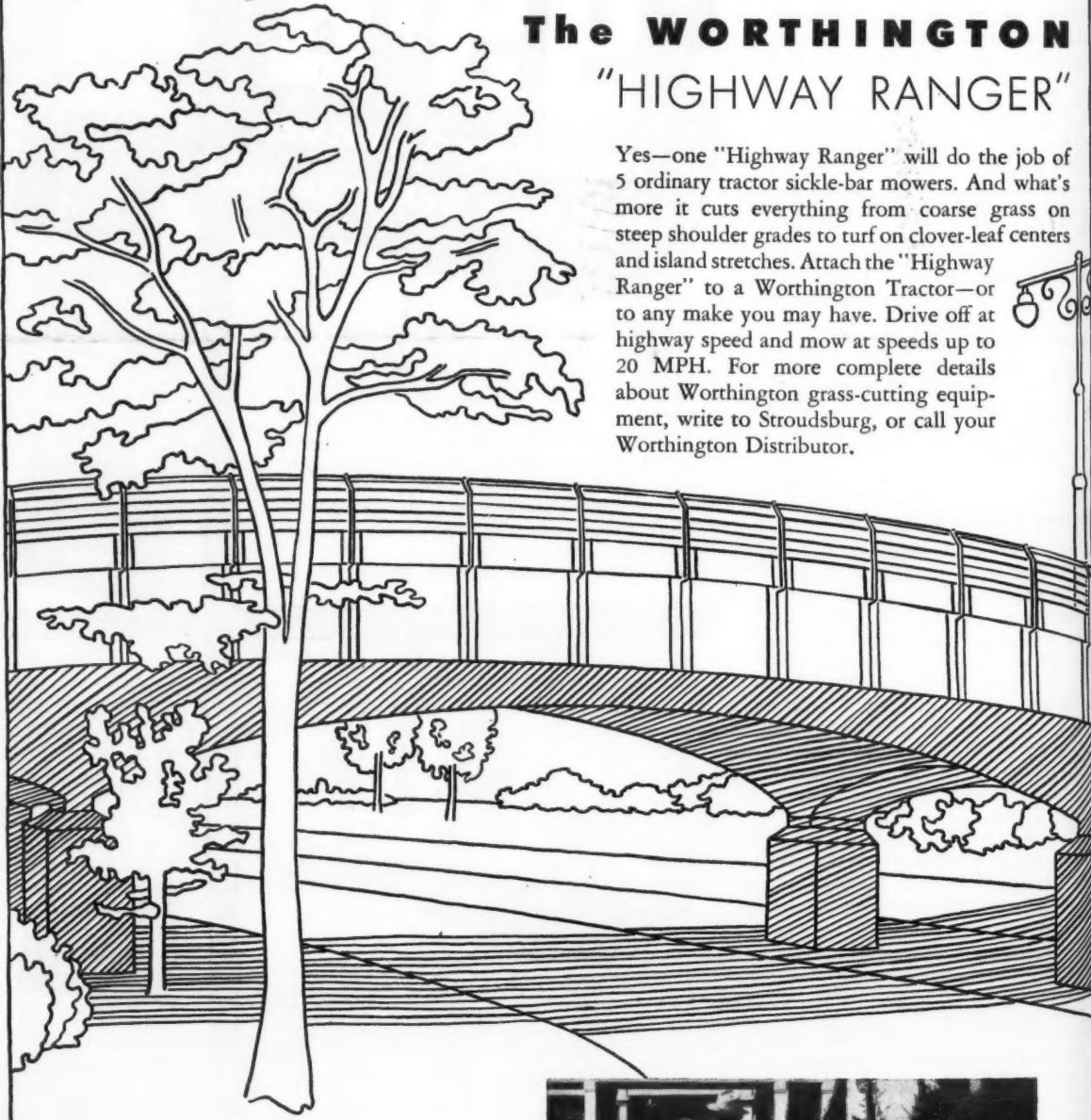
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The WORTHINGTON "HIGHWAY RANGER"

Yes—one "Highway Ranger" will do the job of 5 ordinary tractor sickle-bar mowers. And what's more it cuts everything from coarse grass on steep shoulder grades to turf on clover-leaf centers and island stretches. Attach the "Highway Ranger" to a Worthington Tractor—or to any make you may have. Drive off at highway speed and mow at speeds up to 20 MPH. For more complete details about Worthington grass-cutting equipment, write to Stroudsburg, or call your Worthington Distributor.

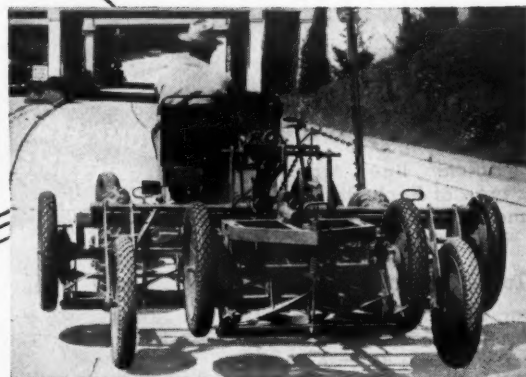


WORTHINGTON MOWER COMPANY

STROUDSBURG, PENNSYLVANIA

Established in 1914

Division of Jacobsen Manufacturing Company



Turnpike Grading

(Continued from page 2)

to the contractors who entered not at all into the negotiations, but to the Authority which paid for the amount that was excavated. These agreements even included access to the sites for the construction of haul roads.

From the map and from investigations of their own, the contractors decided which pits they preferred to use. They based their selection on a short haul and the minimum amount of clearing required to reach the sites. The only stipulation was that they had to take their material from beyond the right-of-way limits; they could leave no scars on the landscape that might be seen from the road. In this way the contractors were not loaded up with legal matters; and controversies, which in the past have accompanied the construction of toll roads where borrow was obtained by the contractors, were eliminated. The contractors were paid for excavating the material and also for overhaul when the haul distance exceeded 1 mile.

Of the total 4,417,000 cubic yards of excavation, the Savin Construction Co. had 2,337,000 yards on its half. This included 2,050,000 yards of common excavation bid at 55 cents, and 260,000 yards of rock at \$2.00. The remainder included 20,000 yards of muck at 50 cents, and 7,000 yards for structures at \$4.00. On the upper half, the Lane Construction Corp. had 2,080,000 total yardage, of which 2,000,000 yards was common excavation at 40 and 45 cents. Only 50,000 yards of rock was encountered on the two Lane sections, which had bid prices of \$1.50 and \$1.25. Muck, of which there was 20,000 yards, went for 50 cents, while the 10,000 yards for structures had prices of \$4.00 and \$2.50.

Savin Contract

On the lower half of the Turnpike the Savin Construction Co. started operations by putting 100 men to work clearing the 730 acres of timber. They used both hand tools and ten power chain saws, either Malls or Disstons. When the logs were cut up, neighborhood mills hauled them away for use as pulp or lumber. Tree stumps were pushed out of the ground by tractor-dozers and either dumped off the right-of-way or burned.

The heavy work on this contract was in the rock excavation where cuts up to 22 feet were encountered. Blasting holes were drilled with 10 Ingersoll-Rand and 3 Chicago Pneumatic wagon drills, and 6 Ingersoll-Rand Jackhammers. Power was supplied by 10 compressors: one 900-cfm and two 500-cfm Chicago Pneumatics, six 315-cfm Ingersoll-Rands, and one Gardner-Denver 315-cfm mounted on a Mack truck. The drills used 1 1/4-inch steel with Timken bits ranging from 2 3/4 down to 2 1/2 inches in size. These opened holes from a few inches to 5 feet deep per bit, depending on the hardness of the rock.

Drill holes had an average spacing of 5 feet on centers, and as many as 150 to 175 were shot at one time in taking out a full lift. Hercules 60 and 40 per cent dynamite did the blasting. The



C. & E. M. Photo

A 10-yard end-dump Euclid receives a load of undesirable material removed from the roadbed of the Maine Turnpike by a Northwest 1 1/2-yard shovel.

charges varied according to the depth of the hole. On the deep 22-foot holes, about 5 to 6 feet of dynamite was placed

at the bottom of the hole which was then filled with tamping material. The usual procedure was to place the 60-

per-cent-strength powder at the bottom of the holes and the 40 per cent on top.

The rock was loaded by two shovels, an 82 Lorain 2-yard and an 80-D Northwest 2 1/2-yard, into a great variety of equipment for hauling to the fills. This hauling equipment included:

- 10 Super C Tournapulls with 210 scrapers
- 8 14-yard bottom-dump Euclids
- 3 Sterling 8-yard trucks
- 6 Linn 8-to-10-yard Hafttraks
- 3 Athey 14-yard wagons pulled by two Caterpillar D8 tractors, and an International TD-18 tractor

Some of this equipment was also used on the dirt hauls. The crawler-type earth-movers were kept within 1,000-foot haul distances, while the rubber-tired equipment was used on the longer hauls up to 3 miles. Also in use on the earth-moving were five Super C Tournapulls pulling LeTourneau LP 12-yard scrapers which were snatch-loaded by a D8 tractor, with a D7 acting as a pusher.

When embankments were being built, the material was spread in 9-inch layers and leveled off with two D8 tractor-

(Continued on next page)

LOW EQUALIZER SPRING LOADS

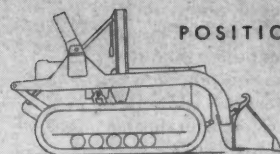


An example of unequalled
DOZER-SHOVEL
design

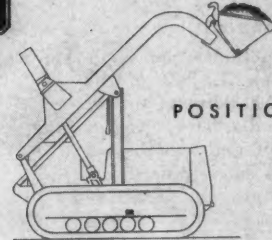
All the inherent operating characteristics of International TracTracTors are retained when Bucyrus-Erie DOZER-SHOVELS are mounted on them.

Take the matter of TracTracTor equalizer-spring loads, for instance—it offers a typical example. Because of the DOZER-SHOVEL'S unique design by which forces balance and offset each other, equalizer-spring loads are never excessive, regardless of the position of the shovel bucket. Look at the illustrations given here: In position "A," when starting to lift the bucket, the guide rollers in the lift arm guides press forward against the front rail, tending to increase the load on the spring, but at the same time a balancing force is set up in the rocker arms which tends to reduce the load on the spring. In "B," both these tendencies are reversed. In all positions, these tendencies offset each other, with the result that the DOZER-SHOVEL attachment imposes no excessive weights on the TracTracTor equalizer spring. This is an exclusive Bucyrus-Erie feature! In a

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POSITION "A"

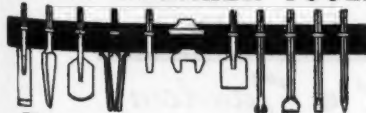


POSITION "B"

DOZER-SHOVEL and TracTracTor combination you have an earthmoving tool that converts full tractor speed, power, and flexibility into outstanding digging, loading, bulldozing, and lifting service. Ask your International TracTracTor distributor about such important features as oscillating tracks, exceptional versatility, full front visibility, low clearance, positive down pressure — all big contributors to big output. BUCYRUS-ERIE COMPANY, South Milwaukee, Wis.

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"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



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Turnpike Grading

(Continued from preceding page)

dozers. Compaction on the roadway was achieved with a LeTourneau sheepsfoot roller pulled by a D7 tractor. The median strip was compacted by two Bros rubber-tire rollers pulled by Oliver 70 rubber-tired tractors. A Caterpillar No. 12 power grader did the final shaping.

For drainage excavation a Northwest 25 3/4-yard Pullshovel was used, along with two Lorain 80 cranes and a Link-Belt Speeder crane. The former was equipped with an Owen and the latter with a Williams clamshell bucket of 1 1/2-yard size. All booms were 60 feet.

The shovels on the job were also in use at the borrow pits for loading both earth for the fills and gravel for the foundation. Average haul for roadway borrow was 3 miles, while the gravel or pervious material required a 5-mile haul.

Subcontractor H. D. Maselli Corp. had the following equipment at work on its 5-mile job: 2 P&H shovels, a 2 and a 1 1/2-yard unit; 3 bottom-dump 14-yard Euclids; and 5 International 5-yard trucks for the earth-moving. Two Caterpillar tractor-dozers, a D8 and a D7, spread and compacted the material.

Equipment Maintenance

Major repairs to equipment were done at the Southworth Machine Co. in Portland. But a small maintenance shop was set up near Moody at about the center of the Savin contract. Two Sterling truck trailers, 45 and 25-ton, were used to haul the equipment when necessary. Greasing was done in the field with two portable Alemite rigs mounted on Ford and Chevrolet trucks. Brunner air compressors supplied the necessary high pressure for the five hose mounted on reels, which furnished gear lubricant, motor oil, air, and two kinds of chassis lubricant. Equipment was serviced daily and also on Saturdays when the regular 10-hour work day was shortened to 8 hours to take care of maintenance.

Esso gasoline and diesel fuel was delivered to the job from Portland and stored in two 5,000-gallon tanks near the shop. Also scattered about on the job were six 500-gallon tanks mounted on skids which were pulled about by tractors to refuel the equipment when needed. Texaco greases and RPM motor oil were used for lubricating.

About 150 men, a peak total, were employed in addition to the land-clearing crew on the Savin Construction Co. contract.

Lane Contract

The Lane Construction Corp. likewise started work on its half of the project by clearing 500 acres of timber up to 30 inches in diameter. Crews used two Mall 24-inch and two Disston 36-inch power chain saws, plus a variety of hand saws and axes. Tractor-



C. & E. M. Photo

Some rock was encountered in the grading for the Maine Turnpike. Here five wagon drills, three Ingersoll-Rands and two Chicago Pneumatics, are at work in a rock cut.

dozers were used to pull out small trees and push over stumps. The timber was sold to lumber or pulp companies which hauled it away, while the stumps were either burned or wasted in low areas off the Turnpike.

The rock on this end of the job was less in volume and also softer and more

shaley than on the southern half; the maximum rock cut was 18 feet. Holes were drilled with five Ingersoll-Rand wagon drills for the main blast holes, and with eight I-R Jackhammers for the secondary blasting. Air was supplied by a Chicago Pneumatic 500-cfm; a Sullivan, an Ingersoll-Rand, and a

Gardner-Denver 315-cfm; and two Gardner-Denver 205-cfm compressors. Du Pont 40 per cent dynamite was used to charge the holes.

When Lane started the job a great deal of its own equipment was tied up on other jobs. So until it was available, other equipment was rented from fourteen different companies. Thirty tractors, of which about 60 per cent were rented, started the job. They included:

- 15 Caterpillar D8
- 5 Caterpillar D7
- 1 Caterpillar R4
- 4 International TD-18
- 1 International TD-14
- 4 Allis-Chalmers HD-14

Of these, 9 of the D8's were used with LeTourneau scrapers, 6 with 12-yard units and 3 with 15-yard units; while 2 of the HD-14's pulled Gar Wood 12-yard scrapers. The tractor-scraper fleet was later augmented by 6 other LeTourneau scrapers and 24 other tractors, mostly D8 and D7 machines, both contractor-owned and rented. The scrapers were used on hauls up to 1,000

(Concluded on next page)

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The Biggest Little Hoists in the world for use where power is not practical, available, or sufficient.

2-Ton "Lightweight"	75 ft. 1/4"
5-Ton "General Utility"	250 ft. 1/4"
15-Ton Triple-Geared "Special"	1200 ft. 1/4"

With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	\$ 50
5-Ton 4 & 24 to 1	110 lb.	75
15-Ton 4, 19 & 108 to 1	680 lb.	250

BEEBE BROS.

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Seattle 4, Washington

Turnpike Grading

(Continued from preceding page)

feet.

On roadway excavation and common borrow the hauls averaged a mile, but for the gravel a 4-mile haul was the average. On these long hauls the material was moved with rubber-tired equipment after being excavated by shovels. The shovels included:

- 1 Bucyrus-Erie 2-yard
- 3 Bucyrus-Erie 3 1/2-yard
- 2 Northwest 1 1/2-yard
- 1 Northwest 3 1/2-yard
- 1 Link-Belt 1 1/2-yard
- 1 Lorain 1 1/2-yard
- 1 Lima 1 1/2-yard
- 1 Lima 1 1/2-yard

These units were used in roadway excavation, in the borrow pits, and on drainage work with crane booms substituted for the shovel booms.

The rubber-tired earth-movers included 16 bottom-dump 13-yard Euclids for borrow and permeable-material haul, 12 end-dump 10-yard Euclids for stump and rock disposal, and 7 Tournapulls for roadway hauls, along with 3 Mack 8 to 12-yard trucks.

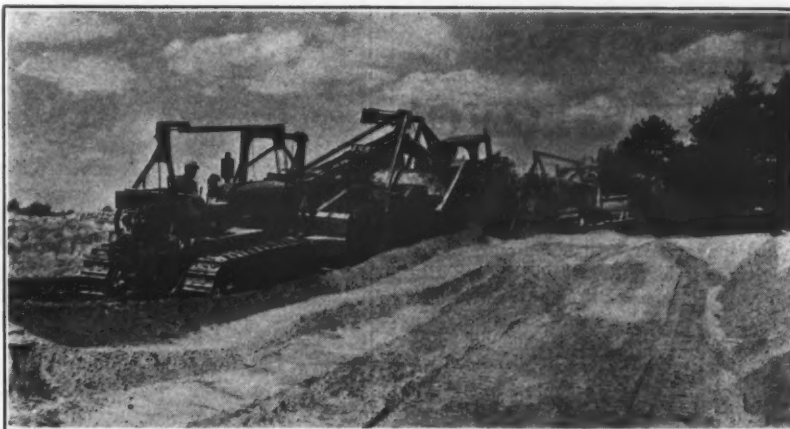
Material was spread in 9-inch layers on the roadway and compacted by five sheepsfoot rollers pulled by tractors. The median strip was compacted by four Bros rubber-tire rollers pulled by Farmall rubber-tired tractors. Equipment also included three Buffalo-Springfield 12-ton 3-wheel rollers, and three Caterpillar power graders.

Equipment Maintenance

Major repairs to equipment were done at the Lane permanent shop located in Brunswick, Maine, 27 miles north of Portland. In addition, the contractor set up three smaller shops, one at the center of the job near Saco and the other two close to each end. For moving equipment to Brunswick if necessary, or to various parts of the job, a Rogers 25-ton trailer pulled by a Mack truck was used. The Saco shop also was fitted out as a stock room for parts and tires. Here batteries were charged on a G-E Tungar charger, and equipment was fueled from a 5,000-gallon diesel fuel tank or a 3,000-gallon gasoline tank. The Socony Vacuum Oil Co. from Portland kept the tanks filled. The Saco shop measured 30 x 55 feet, while the other two were smaller, being 30 x 30-foot structures. All were of wood construction with concrete floors.

The contractor worked five 12-hour days a week, leaving the other two days for servicing equipment. Essential parts of equipment were greased during the day, and the entire unit was serviced after working hours, with light if needed furnished by a Homelite generator. Two fuel and grease crews, each consisting of a mechanic and four helpers, made the rounds of the equipment throughout the day. They used a mobile service station, and a tank truck holding 650 gallons of fuel.

During the first few months the excavation progressed at the rate of about 60,000 yards a week. By August, when the additional equipment had arrived, this total stepped up to 75,000 yards a week and was held throughout the job. Careful check was kept on the progress of the job by charts in the contractor's office. These were drawn to a large scale and hung up on the wall for ready observation. One chart covered all the operations; as each advanced, a colored pencil was drawn across the face of the chart filling in the stations that were completed. The lines were horizontal and a different color indicated the various items of clearing, grubbing, drainage, excavation, earth fill, base course, and stripping. Another chart covered excavation only, with the yardage indicated on the vertical axis and the months on the horizontal axis. A black line indi-



C. & E. M. Photo

A Caterpillar D8 snatches a Super C 12-yard Tournapull on the Maine Turnpike.

cated the proposed amount of excavation scheduled for each month. A red line was drawn to show the actual amount of work done. Thus by a glance one could see if the job was up to schedule or not.

From 250 to 400 were employed on the Lane contract.

Quantities and Personnel

The major items included in the four sections of the 47.4-mile Turnpike are:

	Savin Contract	Lane Contract
Common excavation	2,050,000 cu. yds.	2,000,000 cu. yds.
Rock excavation	260,000 cu. yds.	50,000 cu. yds.
Concrete	1,890 cu. yds.	2,900 cu. yds.
Reinforcing steel	247,000 lbs.	417,000 lbs.
Concrete pipe, 12 to 54-inch	14,990 lin. ft.	16,760 lin. ft.
Underdrain	30,000 lin. ft.	28,000 lin. ft.

For the Savin Construction Co., L. F. McCarthy is Superintendent, and R. E. Lee is Engineer. For the Lane Construction Corp. E. D. Moore is General Superintendent, and C. O. Parsons is Engineer, with Howard Saltmarsh and J. R. Wylde, Superintendents on each of the two sections making up the Lane project. Fred Stein is Mechanical Supervisor of equipment.

N. C. Watkins is Resident Engineer in charge of the southern half of the Turnpike construction. J. P. Doyle is Resident Engineer on the northern end for Howard, Needles, Tammen & Bergendoff, Consulting Engineers of Kansas City and New York, which is supervising the work. L. C. Hammond is Project Engineer, and L. D. Brown is Assistant Project Engineer.

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For the big jobs ahead this year, Grace has a Sweeper ready to go to work for you... doing the job economically, efficiently, built on engineering principles. With extra-long-life bristles... for cleaning road base prior to applying asphalt, sweeping streets, or for airfield work. Available in axle driven (above), motor driven, or for front end of tractor types.

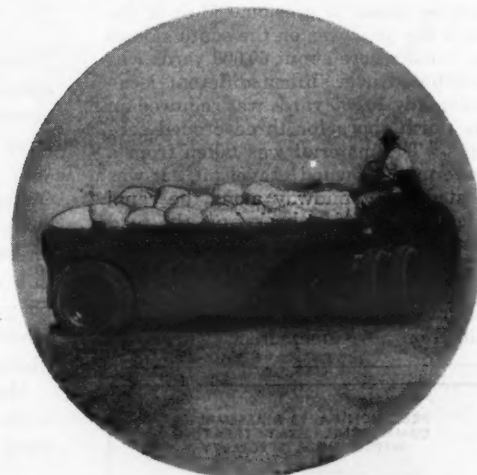


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Grace Circulating Tank Car Heaters have proven to be the fastest way to heat the coldest car of asphalt. Flues are specially designed to heat and unload any type asphalt from tank cars. Pumps up to 250 GPM, reaching and maintaining temperatures up to 450° quickly and economically. Flue construction provides positive circulation and prevents burning or overheating.

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Eroded Canal Slopes Restored With Gravel

Hauled by Trucks From Pit To Dragline Which Cast 70,000 Yards of Material On 18 Places Below Riprap

★ ERODED side slopes on the Cape Cod Canal in Massachusetts, connecting Buzzards Bay on the west and Cape Cod Bay on the east, were repaired last summer. A layer of gravel was placed over eighteen different sections ranging in length from 150 to 600 feet. The work was done by contractor John Gallo who has his headquarters at Sagamore, Mass., near the east end of the Canal. The contract for depositing 70,000 yards of gravel at specified locations was awarded by the U. S. Corps of Engineers on the low bid of \$64,000. The material for the work was furnished by the Government, and the job was completed between the latter part of May and the middle of August, 1946.

From the pier at Buzzards Bay to the breakwater at Sandwich the canal is 8 miles long; it has a bottom width of 480 feet, and a project depth of 32 feet at mean low water. In some areas it has eroded an additional 10 feet. Below the mean low water line the side slopes are $2\frac{1}{2}$ to 1, while above that to the top of the bank they are 2 to 1. The slope of the canal is protected by riprap 5 feet below to 5 feet above mean low water. The slopes erode in certain areas below the riprap, and this erosion must be repaired or a slide will occur, with loss of riprap and the service road.

Prior to 1945, slope restoration was accomplished by dumping gravel loads from scows along the banks, and in 1944 over 100,000 yards was deposited in such a fashion. A big shortcoming in this method, however, was that the scows, which held from 1,200 to 1,500 yards each, could not be brought close to the sloping bank because of their draft. In the autumn of 1945 a new method was tested: the gravel was cast in place from a dragline working along the bank of the canal. Some 30,000 yards of material was deposited along the north bank of the canal by the same contractor who did the work this past summer. As this method was found satisfactory, it was continued.

Government Gravel Pit

The terms of the contract were that the Government would supply the gravel, and the contractor would place it in the areas where recent surveys had given evidence of erosion. Most of the work this year was on the south side of the canal where about 60,000 yards was distributed over fifteen different locations; only 10,000 yards was required on the north shore for three eroded sections. The material was taken from a Government-owned gravel pit. It was located about midway along the canal a few hundred feet back from the road that runs along the south shore.

The gravel was of excellent quality for the intended purpose; tests showed that more than 50 per cent of it was retained on a $\frac{1}{2}$ -inch screen, which was

of the coarseness desired. The pit had a face 150 feet long and was worked to a height of 18 feet by a Lima 2-yard shovel. An Allis-Chalmers Model M tractor-dozzer worked around the shovel. It pushed the loosened gravel to it for easier handling in loading the eight or nine trucks of various makes and sizes. These were rented by the hour to haul gravel from the pit to the dragline. The average haul was 3 miles.

From the gravel pit the trucks crossed the highway and then the line of the New Haven Railroad (in the interest of safety, the contractor maintained a grade-crossing tender there), and gained the 18-foot macadam service road which runs about 40 feet back from the edge of the canal. This road

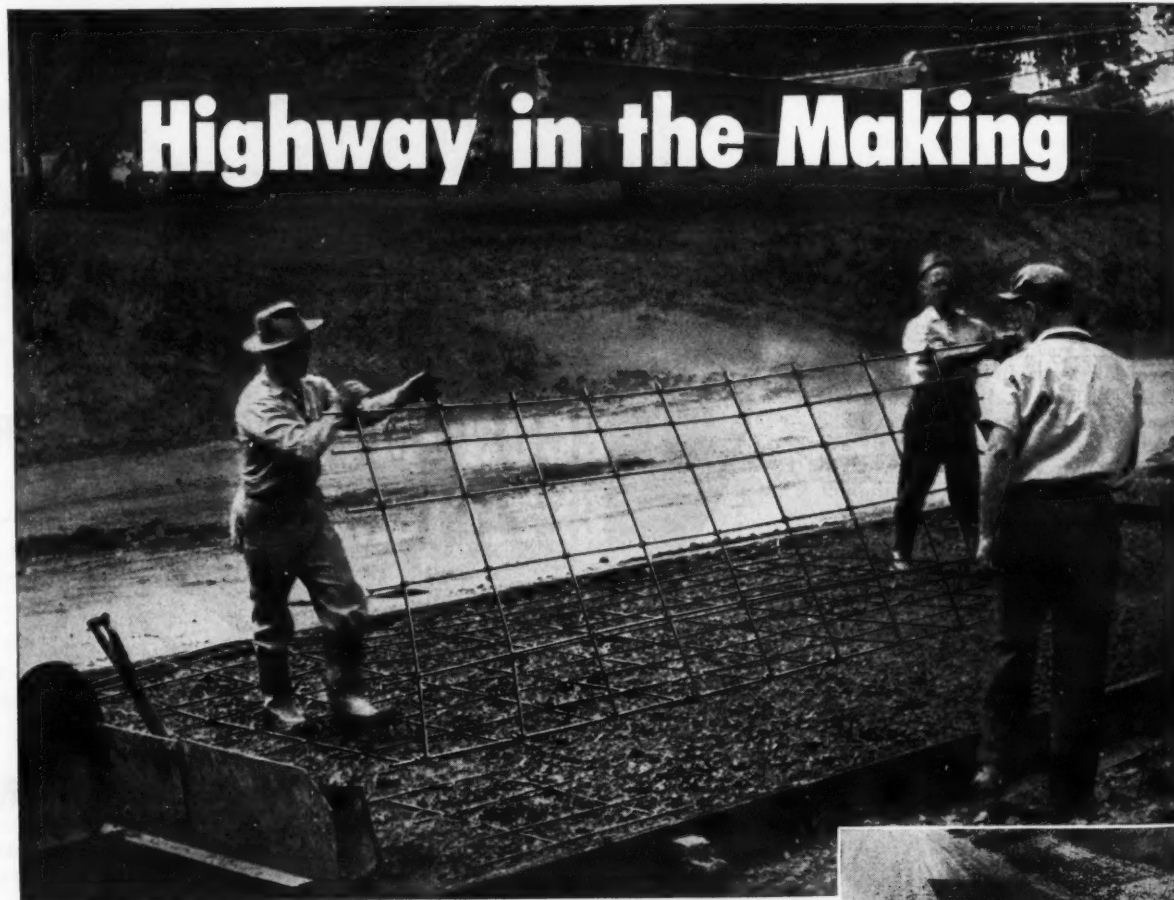


C. & E. M. Photo

A Lima 2-yard shovel loads a Ford truck with 5 yards of gravel in a Government borrow pit. The material was used to restore eroded slopes along the Cape Cod Canal in Massachusetts.

is Government property. It is used only for inspection and maintenance opera-

tions, so the truckers had it for their (Continued on next page)



Because Bethlehem hinged bar mats can be folded to about half of the standard mat size, they can be handled by two men, and easily trucked without exceeding the road-width limit set up by state highway departments.

These on-the-job photographs were taken near Avon, N. Y., during construction of a six-mile, two-lane stretch of Route 5—through highway from Albany westward to Buffalo. Built for New York State Division of Highways by the Potter-DeWitt Co. of Pavilion, N. Y., this new section required 62,000 sq yd of concrete. Bar mats and other steels for the job were furnished by Bethlehem.

Many contractors regularly turn to Bethlehem whenever they need steel to build a highway or high-

way bridge. Bethlehem steel service saves time and money. You can obtain from this one source practically every type of steel needed to build a modern highway or bridge. And Bethlehem handles your order as a unit, with individual items scheduled to reach the job when needed. You avoid a lot of needless follow-ups, and minimize bookkeeping.

Next time you have a contract for a highway- or bridge-building job, regardless of size, put your steel requirements up to Bethlehem.

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

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Bar Mats	Guard Rail
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Wire Rope and Strand	Hollow Drill Steel
Fabricated Structural Steel	
Sheet and H-Piling	Spikes
Timber Bridge Hardware	
Bolts and Nuts	Tie-Rods

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and HARDCHROME PLATING

GRINDING

Metallurgical Laboratories
ENGINEERING DIVISION
AGERSTRAND CORPORATION
Muskegon, Michigan

Eroded Canal Slopes Restored With Gravel

(Continued from preceding page)

sole use. Trucks hauled the gravel over this road to where the dragline, a Manitowoc Speedcrane with a 60-foot boom and a Page 1¼-yard bucket, was working.

The trucks dumped the gravel in a pile on the road in front of the dragline. That machine scooped it up and cast it out over the slopes. From its location on the service road the dragline, by clever handling to get full advantage of the long boom, reached any desired position over the slope to discharge its load. By whipping the boom around quickly, the operator swung the bucket far out on its cable so that the gravel was deposited on the slopes at approximately 10 feet below mean low water, to an average thickness of 4 feet.

In this way the sections subject to erosion were stabilized. An average of 900 yards of gravel was deposited in a 9-hour working day. In addition to the truck drivers, the contractor employed a force of eight men on the project. These included a foreman, shovel operator, oiler, and dozer operator in the gravel pit; a watchman for the grade crossing; a dragline operator, oiler, and truck checker working along the canal bank.

Safety Stressed

As on all U. S. Engineers' contracts, safety was stressed constantly. As a result, a no-accident record was maintained with only one close call occurring. This "near-miss" happened on Saturday afternoon, June 29. The dragline was working along the south bank of the canal near the Sagamore bridge at the east end. The operator of a Mack 7½-ton FN diesel truck was returning to the pit on the 18-foot service road for an additional load of gravel. Misjudging the distance between his own and an approaching gravel truck, he let his big truck get off the pavement and slip down the 2 to 1 side slope so that all six wheels were off the road. The driver leaped from the cab, but the truck clung to the slope and did not overturn.

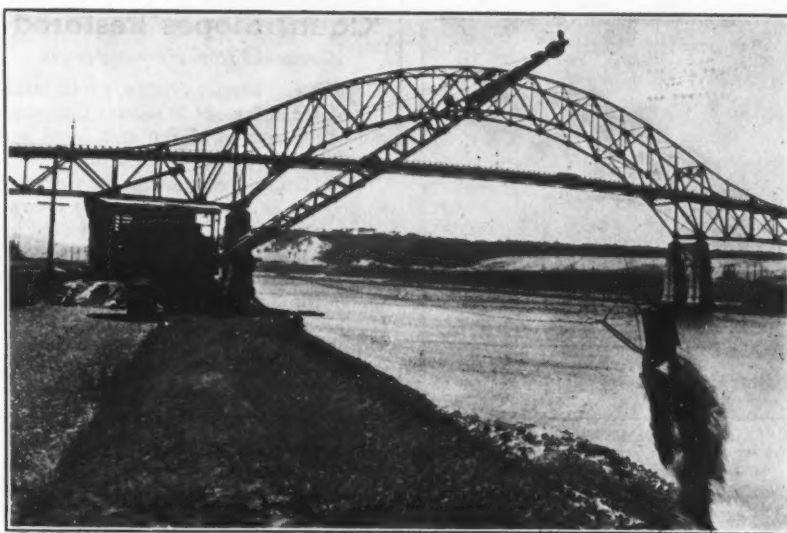
Contractor John Gallo hurried to the scene. At once he had holes dug under the left dual rear wheels of the truck to anchor it and keep it from rolling any further downhill. He then brought the little Allis-Chalmers tractor from the gravel pit, and stopped another Mack truck which was taking a load of gravel to the dragline. To this truck he fastened 45 feet of 5/8-inch cable, and to the tractor a 25-foot length of 1-inch cable. He passed the two ends around the rear frame on the uphill side of the balancing truck. With tractor and loaded truck moving forward in low gear on the service road, the empty truck was easily pulled, rear end first,

back to the pavement to continue with its hauling.

Canal and Personnel

The Cape Cod Canal was dug without locks as a private venture to cut off 70 miles of sailing for ships which ply between Boston and New York and other ports to the south. Financed by August Belmont, the canal was built for \$16,000,000 and was opened to traffic in 1914. Since then it has saved shipping the troublesome and sometimes stormy passage in the ocean around the outer rim of Cape Cod. In 1928 the Federal government purchased the canal, and later widened it from its original 100 feet to the present broad channel.

At each end the canal is spanned by a steel-arch highway bridge. It is also crossed at the west end near Bourne by a lift bridge of the New Haven Railroad. Normally this bridge is in the "up" position, since shipping traffic is heavier than rail at this point. It is lowered at the approach of a train, reversing the



C. & E. M. Photo

A Manitowoc Speedcrane with a 60-foot boom and a Page 1¼-yard dragline bucket places gravel on eroded slopes along the Cape Cod Canal.

usual procedure at such crossings.

The canal is usually dredged twice a

year to maintain the 32-foot channel.

(Concluded on next page, Col. 2)

Why **AQUELLA** is a "must" on every concrete masonry unit job!

As everyone in the construction industry knows, the water permeability of light weight concrete masonry units leaves no room for argument! The only possible argument lies in the means and methods of applying an *effective* water barrier to this excellent construction material.

You are well acquainted with the claims made for the many materials designed to "waterproof" concrete masonry units.

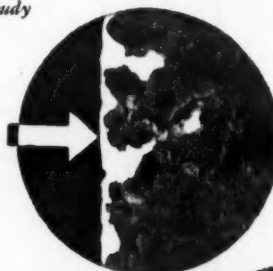
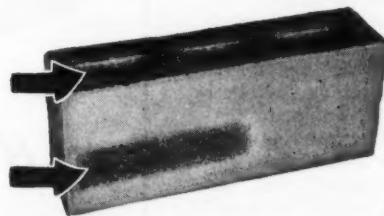
But despite these many materials there must be a reason why Aquella is being so widely used throughout the nation today and acclaimed by home owners, architects, engineers, waterproofing contractors and builders! The answer lies in the simple fact that it works on an *entirely new principle!*

To Illustrate:

1 Here is an Aquellized concrete masonry unit filled with water. Naturally, there is no leakage.

2 But what happens if the Aquella surface coating is scraped off? To answer that, we scraped away this portion, and there's still no leakage. This may be slightly puzzling until you study the photograph of the third step...

3 The enlargement of a small, sawed-away section of the above block, which shows the way Aquella penetrates to fill and close the microscopic pores of the surface. It is the filling of the pores—not essentially the surface coating—which stops the penetration of water.



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Equip your road equipment, snow plows, etc., with dependable and highly flexible hose assemblies. Factory assembled units with permanent couplings are available from 3/16" I.D. to 1½" I.D. inclusive in high pressure, medium pressure, or low pressure constructions.

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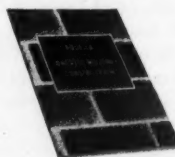
ANCHOR COUPLING CO., Inc.

342 N. Fourth Street Libertyville, Illinois
Factory Branch
12303 Cloverdale Ave., Detroit 4, Michigan

Is it any wonder then, that in a cinder concrete block tower test, Aquella withstood the pressure exerted by an 8 ft. hydrostatic head of water, equivalent to approximately 500 lbs. pressure per sq. ft. at the base?

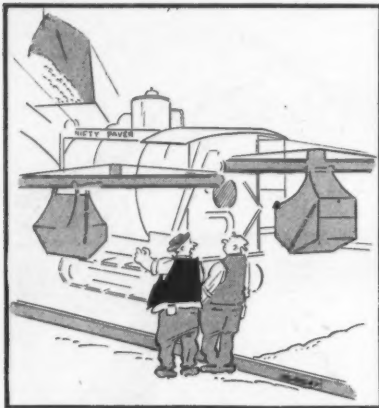
We would like to send you details of this test. It is contained in our booklet, "Aquella and Concrete Masonry Construction." This booklet also

contains many illustrations of the uses of Aquella in concrete masonry construction throughout the United States, and should prove very interesting to all in the construction industry. It is yours for the asking.



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"And this boom is for paving drive-ways, intersections, and other little things that slow paving up."

Air-Entrainment Is Discussed By Engineer

Air-entrainment in concrete, one of the most discussed subjects in the concrete fraternity at the present time, was the subject of a paper delivered at the Fall Meeting of the American Society of Civil Engineers, at Kansas City, Mo., by Charles E. Wuerpel, head of the Concrete Research Division of the U. S. Waterways Experiment Station, U. S. Engineer Department, Vicksburg, Miss.

Mr. Wuerpel feels that the time has arrived for emphasizing the increased requirements for accuracy in the design and control of the mixture used to produce air-entrainment. He told his listeners that it is generally accepted "that the presence of widely dispersed spheroids of air in concrete will increase the resistance of the hardened mass to frost action and to chemical action by salts used for de-icing pavements, far beyond that achieved with non-air-entrained concrete." But it is perhaps less widely accepted that purposeful air-entrainment will benefit concrete structures of other than the pavement type. However, he said, the data have accumulated in sufficient amount to have satisfied the U. S. Engineer Department that air-entrainment used with appreciation of its sensitivity is beneficial in all types of concrete.

He pointed out that the purposefully created air bubbles "constitute an additional aggregate in the mixture possessing complete flexibility of shape". He stressed their advantages over rigid angular and sub-angular grains of sand or cement which will not accommodate themselves to the movement of other grains. He told the civil engineers that the process reduces the "water-of-convenience" in concrete "better than any other means yet discovered", that "the improvement in uniformity of bond offsets completely the possible slight reduction in bond strength", and that "reinforced concrete is benefited by the use of air-entrainment".

"There is strong reason to believe", Mr. Wuerpel said, "that some of the concrete placed prior to the era of purposeful air-entrainment may have derived abnormal durability from non-purposeful entrainment of air". Oil-leaking grinding mills or the introduction of saponifiable matter as a grinding aid may have furnished a medium of air-entrainment during the manufacture of the cement.

Change in Link-Belt Administrative Staff

George P. Torrence, Executive Vice President of Link-Belt Co. since July 1, 1946, became President of the company on November 1, succeeding William C. Carter. Mr. Torrence joined Link-Belt in 1911 as a draftsman, and has served in various capacities since. He was Manager of the Indianapolis operations from 1926 to 1932, and President from 1932 to 1936.

Mr. Carter, former President, continues as a director of the company and as Chairman, Executive Committee.

Canal Slopes Restored

(Continued from preceding page)

A sea-going hopper dredge, which hauls the material far out to sea for dumping, does the work in March and April and again in September and October.

H. P. Dunbar represents the Corps of Engineers as Superintendent in charge of maintenance of the canal, assisted by H. L. Colbeth. At the time the eroded side slopes were repaired, the canal was under the supervision of Colonel C. T. Hunt who was District Engineer at Boston. Since that time, all of the construction activities of the Corps of Engineers in New England have been consolidated in the New England Division. Brig. Gen. Raymond G. Moses is Division Engineer, located in Boston.

On the slope-erosion repairs, William Turner from the Engineer Sub-Office at Buzzards Bay was Resident Engineer and Kenneth Colbeth was Inspector. For John Gallo, the contractor, Dante Tassanari was Superintendent, assisted by William Anderson.

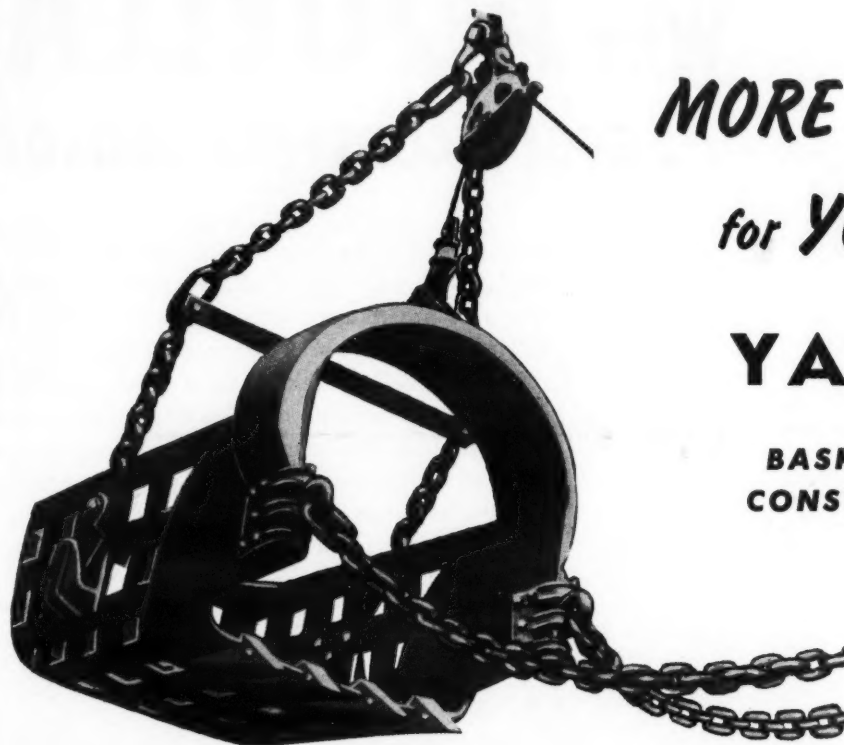


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We can make shipment in five days on any bucket up to and including four yards. For full information ask your Yaun distributor or write Yaun Dragline Buckets & Mfg. Plant, Baton Rouge, La.



"More YARDAGE with a YAUN"

Wooden Forms Built For Concrete Pours

Tower Lifts Batches Four Floors in Press Building Addition; Central Mixing Plant Near Job

THE Rumford Press at Concord, N. H., which prints such high-circulation magazines as *Readers Digest*, among others, is enlarging its facilities. It is constructing a 100-foot-square four-story addition, and a 250 x 140-foot one-story addition, to its present 200 x 100-foot four-story press building of brick and concrete construction.

Work on the new buildings started the latter part of March, 1946, and will be completed some time in 1947 at a cost of around \$1,000,000. Because of the delays in obtaining construction materials (reinforcing steel, for instance, was delivered seven weeks behind schedule), the completion date cannot be definitely stated. The Austin Co. of New York City has designed the new additions. It is also directing construction, which is being done by the Davison Construction Co. of Manchester, N. H.

Like the existing building, the new four-story addition which abuts it will also be of reinforced-concrete construction with brick curtain walls. The large one-story structure will be used solely as a pressroom and storeroom; it will have concrete and brick walls supporting steel trusses and a steel roof. As in all reinforced-concrete construction, form-building was a precise and painstaking operation. But the pouring of the concrete was simplified and speeded through the use of a 105-foot steel tower. This lifted the concrete, which was conveyed to the site in truck-mixers from a near-by central plant, to all levels of the new structures.

Foundation Work

Over 10,000 yards of excavation was removed for the foundation of the plant, which is located along the main line of the Boston & Maine Railroad. This averaged 8 feet in depth, but a maximum of 14 feet was reached in certain areas because of its side-hill location.

For the most part, the soil excavated was silty fine sand with a small amount of clay. It was dug out with a P&H ¾-yard shovel and a P&H ¾-yard trench hoe. But there was also a scattering of white granite deposits, generally in the form of boulders. These were broken up into pieces the shovel could handle by an Ingersoll-Rand Jackhammer driven by a Chicago Pneumatic 105-cfm air compressor. Wedges driven into the drill holes effected the cleavage. A little light blasting with a stick or two of dynamite was resorted to in a few instances.

The excavated material was hauled away in ten 6-yard trucks, rented by the hour, to an empty lot ½ mile distant; there the sand, clay, and rock were wasted. The site was leveled off by the dozer blade on a Caterpillar D7 tractor, which also graded the adjoining parking fields to be used by the employees of the plant.

Under the outer wall of the building are 10 x 10-foot footings and 18-inch walls averaging 8 feet in depth. These support rectangular 38 x 20-inch columns on 20-foot centers. Column forms were built of ¾-inch plywood backed by ¾-inch lumber, with 2 x 4 studs as supports on 12-inch centers measured vertically on the columns. The ends of the studs were held together by steel rods going through them and fastened by steel collars, 4 inches square, above and below.

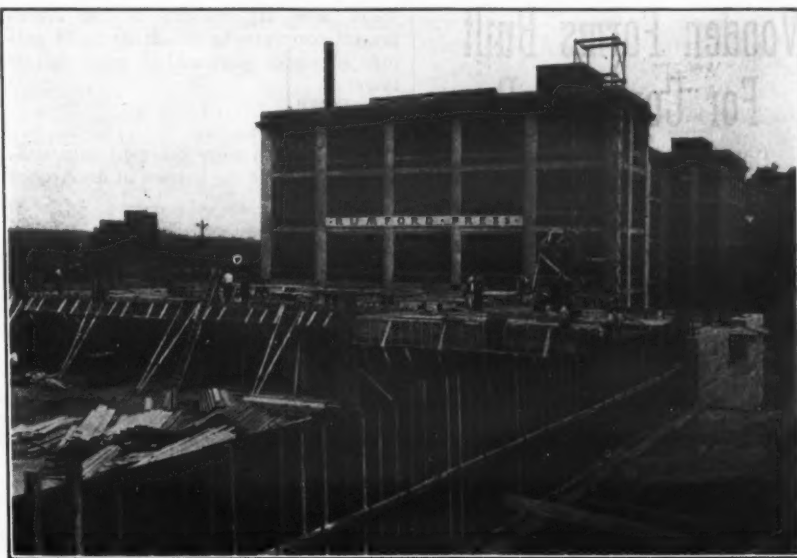
Within the building the foundation

consists of concrete footings 14 x 14 x 2½ feet deep. These support concrete columns, 2 feet 2 inches in diameter, set on 20-foot centers both ways. The columns are reinforced with twelve 1¼-inch steel rods and extend for the full height of the building. They are 12 feet high in the basement and 14 feet above that. Column forms were of sheet metal and flared out at the top on a 45-degree angle to 4½-foot diameter at the floor level.

Wood Forms

The foundation walls at the sides are 1 foot 1½ inches thick. They were poured in wood forms made of ¾ x 12-inch tongue-and-groove stock supported by 3 x 4-inch studs on 16-inch centers.

(Continued on next page)



C. & E. M. Photo

Form-building for the four-story extension to the Rumford Press Building at Concord, N. H., was a precise and painstaking operation for Davison Construction Co. of Manchester, N. H. It used the steel tower in the background to speed concrete pouring.

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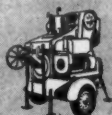
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Wooden Forms Built For Concrete Pours

(Continued from preceding page)

The studs were reinforced with double 2 x 4 wales set on 24-inch centers, and the forms were held together with Richmond screw anchors going through the wales on 27-inch centers.

In this typical flat-slab construction, the basement floor was poured 7½ inches deep. The floors above that are also 7½ inches thick, designed to carry a live load of 250 pounds to the square foot. To support the floor forms, 3 x 4-inch posts were erected on 8 x 8 mud sills and spaced 2½ feet on centers one way and 7 feet the other. Across the tops of the posts were strung 2 x 10 purlins to hold the 2 x 8 floor timbers set on 16-inch centers; to these were nailed the 4 x 8-foot sections of ¾-inch plywood on which the concrete was deposited. The floors are reinforced with two layers of steel bars. By using an electric-driven SkilSaw for cutting lumber, the contractor considerably reduced the form-building time.

Concreting Operations

All concrete used in the construction was purchased from Lockwood Young Corp. of Concord. This company set up a batch plant to the east of the new building on a siding of the B & M Railroad. Both Penn Dixie and Dragon bag cement was delivered to the plant in boxcars, and was stored in a wooden house of 2,000-bag capacity. Sand and stone were supplied by the Manchester Sand & Gravel Co. of Manchester, N. H., which delivered the material after a 14-mile haul in two trucks.

The loads were end-dumped from an earth ramp into a 25-ton wooden hopper lined with sheet metal. From there either the sand or gravel was raised on a 54-foot bucket conveyor to a Blaw-Knox 105-ton 3-compartment aggregate bin. At the top of the conveyor were two chutes with a swivel connection so that they could be swung around to empty aggregate into any compartment.

When the plant was in operation, the bags of cement were cut open and their contents emptied through a hopper onto an enclosed 18-inch-wide rubber-belt conveyor. The cement was lifted 25 feet to the working platform of the batcher. There it was weighed, along with the aggregate, on beam scales before being dumped into the truck-mixers. Three Jaeger truck-mixers mixed and carried the batches to the site just across the railroad tracks; two 4-yard units were mounted on a Reo and a Federal truck, and a 2-yard mixer was carried on a Mack truck.

City water was used for the concrete; a near-by main was tapped with a 1¼-inch pipe. Class A 2,500-pound-strength concrete, with 5¾ bags of cement to the cubic yard, was used over the entire construction with the exception of the slabs, beams, and columns. For these, a stronger 3,000-pound concrete was poured, with 6½ bags of cement to the

yard. The dry weights of the 2,500-pound concrete, to which 30 to 34 gallons of water were added, were as follows:

Cement	540 lbs.
Sand	1,540 lbs.
Stone (1½-inch down)	1,800 lbs.

The batches were dumped into a 3-yard hopper at the bottom of an Archer

Iron Works 105-foot tubular-steel tower. The tower was equipped with an 85-hp gasoline engine to drive the hoist by which two concrete buckets were raised to the level of the floor being poured. The buckets in which the concrete was raised were filled from the hopper; they had safety devices in

the form of jaws which squeezed the pipe framework and prevented their dropping even if the hoisting cable should break. From the buckets the concrete was transferred into small rubber-tired wheel buggies which were easily pushed to the point of deposit.

(Concluded on next page)



At the end of many a rainbow—

If you go to the end of a rainbow, so the fairy tales say, you'll find a pot of gold.

Of course no grownup believes this. But it's surprising how many people believe what amounts to the same thing.

That is, many of us have a dreamy notion that somewhere, sometime, we'll come upon a good deal of money. We couldn't say exactly how this might happen—but we go along from day to day, spending nearly all we make, and believing that somehow our financial future will take care of itself.

Unfortunately, this sort of rainbow-chasing is much more apt to make you wind up behind the eight ball than with a pot of gold.

When you come right down to it, the only sure-fire way the average man can plan financial security for himself and his family is through saving—and saving regularly.

One of the soundest, most convenient ways to save is by buying U. S. Savings Bonds through the Payroll Plan.

These bonds are the safest in the world. When you buy 'em through the Payroll Plan, they mount up fast. And in just 10 years, they pay you \$4 back for every \$3 you put in. They'll come in mighty, mighty handy when the time comes to send your kids to college, to buy a house, or to weather a rainy day.

So isn't it just plain common sense to buy every U. S. Savings Bond you can possibly afford? You bet it is!

P. S. You can buy U. S. Savings Bonds at any bank or post office, as well as at your place of business.

SAVE THE EASY WAY... BUY YOUR BONDS THROUGH PAYROLL SAVINGS

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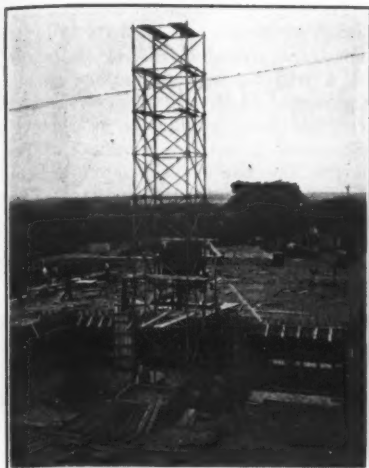
Distributor and Manufacturers' agent wants equipment lines for "Concrete and Material Handling Machinery" Southern tier New York and Northern Pennsylvania.

Write:

Contractors & Engineers Monthly

Box 267,

1719 Daily News Bldg.
Chicago 6, Illinois



C. & E. M. Photo
A view of the Archer Iron Works tubular-steel tower, used to place concrete at various levels in the Rumford Press additions. In the background is the batch plant that supplied the truck-mixers serving the job.

for Allis-Chalmers, Deere, Case, Oliver tractors, etc. Complete details may be obtained by writing to the General Products Division of the company, in Fort Wayne 1, Ind.

Standards Announced For Design of Steel

The official industry standards for light-gage steel have been announced by the American Iron & Steel Institute in a pamphlet entitled, "Specification for the Design of Light Gage Steel Structural Members".

The pamphlet is the result of research carried on at Cornell University since 1939 under the direction of members of the faculty of the College of Engineering. The research has had as its objective a study of the behavior of light-steel structural members under load, and the proper proportioning of such members. It has included a study of available engineering literature on the subject, supplemented by tests on nearly 700 structural specimens.

A technical subcommittee of the Institute's Building Codes Committee, with Milton Male as chairman, prepared the publication.

The specification consists of design provisions governing shapes made up of flat or straight elements such as most commonly encountered in the design of structural members formed of light-gage steel. Design procedure has been simplified by including design tables,

curves and charts, and illustrative examples. There are four appendices which deal with applying the specification.

The pamphlet may be secured from the Institute, 350 Fifth Ave., New York 1, N. Y.

The average number of bidders on F-A highway jobs decreased from 5.7 in January, 1946, to 3.8 in September.

Engines FROM 90 to 215 HP. Generators FROM 60 to 115 KW

More Power
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More Profit

MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.

Wooden Forms Built For Concrete Pours

(Continued from preceding page)

When the four-story addition is completed, the curtain walls and glass windows on the north side of the existing building will be removed; thus one large building will actually be made of the two structures. The coal boilers will be removed from the original building and the entire unit will be heated by three new oil burners supplied from the 10,000-gallon tanks.

Personnel

A force of from 50 to 70 men is employed on the construction of this addition to the Rumford Press, under the direction of George Lundgren, Superintendent for the Davison Construction Co., assisted by Dane Crombie, M. A. Porter is Resident Engineer for the Austin Co.

Peak Rural Travel In September, 1946

Travel on rural roads in September, 1946, climbed to an all-time high for that month, according to figures compiled by the Public Roads Administration from traffic records supplied by state highway departments. The previous September record, established in 1941, was surpassed by 2.7 per cent. The increases were in about the same proportions on state highways and on local roads.

In the first three months of 1946, too, rural travel exceeded that of 1941, the pre-war peak year, by as much as 3 per cent. But this trend failed to continue during the spring and summer months. The increase in rural traffic in 1946 beyond the 1941 peak was largely due to considerable gains in the western states, where September traffic was 27.7 per cent greater than in the corresponding month in 1941.

Urban travel, too, set a new record. And as gaged by gasoline consumption, total travel in 1946 exceeded that in 1941.

Cab for Tractors

A cab is now available for installation on certain wheel tractors to protect operators against dust, rain, heat, and cold. Made by the Tokheim Oil Tank & Pump Co., the cab is of all-steel construction. Its installation is said to be easy and to require no special tools. It has a safety-glass windshield and transparent sheeting in lower front, side, and rear curtains, to give maximum visibility. All curtains may be removed in hot weather. A sectional metal floor enclosure is available at extra cost.

At present the cab is being made largely for Farmall tractors, but other models will be available as developed

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America's Most Complete Line
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All purpose • **SHOVEL**
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• FRONTS, BOTTOMS, SCOOPS AND TEETH shown in red on buckets are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

Experience Counts
See your shovel man or equipment dealer about PMCO Buckets and Dippers.

On the 1/2 yd. and 3/4 yd. Shovel and Pullshovel Buckets, all teeth are interchangeable — a great advantage to operators.

Clamshell
Sizes 3/8, 1/2, 3/4, 1, 1 1/2, 2 yds.

Pullshovel
Sizes 3/8, 1/2, 3/4 and 1 yd.

Dragline
All Purpose Sizes 3/8 to 2 yds.
Stripping sizes 2 to 9 yds.

Shovel
Sizes 3/8 to 18 yds.

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To Lower Maintenance Costs, Landscape Bureau's Function

Roadside Development Starts With Proper Design; Drainage, Slopes, and Planting All Play a Part

By NELSON M. WELLS, Principal Landscape Engineer, New York State Department of Public Works

Reduction of maintenance costs is one of the major objectives in the highway program now under way in New York State. Innovations in the program extend all the way from the preliminary design stages, through construction, to the work carried out by maintenance forces of the New York State Department of Public Works. New principles will be applied not only to new highway construction but to the management and care of the existing highway system.

Some of the construction standards of the program are new in New York State, and they will be new to the men carrying them out. Because they are new, they challenge contractors' engineers to devise ways and means.

The extent of the five-year post-war program to reconstruct public works in New York State is unprecedented. It calls for expenditure of \$840,000,000 by the State Department of Public Works for restoration of the state's highway system and other public facilities. Funds earmarked for highways and urban arterial routes total \$487,000,000. Another \$202,000,000 is scheduled to finance construction of the Thruway, which Governor Dewey dedicated at ground-breaking ceremonies.

To cope with this program, the planning facilities of the State Department of Public Works have been materially expanded. Several new bureaus have been added, including units devoted to State Arterial Urban Route Planning, Safety, Soil Mechanics, and Landscape Development. The latter brings to the Department the landscape architect's point of view on planning and adapting highways (1) to meet the requirements of modern traffic, (2) to form an integral part of the landscapes through which they pass, and on devising ways and means of economical construction and maintenance.

Many projects of the program were planned during the war period; they were to be ready for construction immediately after the cessation of hostilities. Between V-J Day and December, 1946, contracts awarded and in force involved work costing \$50,000,000. Some of the new state-wide standards were included in these first jobs, and an increasing amount will be incorporated in projects subsequently designed. Soon it will be possible to have all such new standards included, and to anticipate further improved standards as they are evolved and evaluated.

Design Modernized

A major change in the standards to date is an evolution in the transverse section of the highway. No longer to be built are the narrow rutted road shoulders, and the V-shaped ditches, which were a traffic hazard and a maintenance burden. Nor will there be 1 on 1 grades on side slopes. Such grades were steeper than the degree of repose of the soil. They invariably resulted in little or no plant growth, excessive erosion, and eroded soils being constantly dug out of ditches and culverts.

The new shoulders are broad—6, 8, 10, and sometimes 12 feet in width. They are wide enough to park a disabled vehicle off the traveled way, and to

provide safety for pedestrians. They slope an appreciable amount away from the edge of the pavement to drain rapidly. Their consistency and structure are being studied to produce year-round stability. In most instances they will be covered by a tough low-growing drought-resisting cover of grasses and legumes. They should then form a proper color contrast with the pavement to meet safety needs. Furthermore, they should be more economical to maintain than raw gravel or most of the previously used surface-stabilization materials.

Increased attention is being given to natural soil formations, the placing of

different soils in embankments, and the movement of underground and surface waters. Drainageways will be variously constructed. Some will be paved, but where the gradient is slight or the runoff is moderate, as with roadside gutters in general and certain flumes on the face of slopes, the ditch forms will be broad, gently rounded earth slopes. These will be well sodded and should minimize both safety hazards and maintenance costs; they will also appear more natural.

The degree of slope on both cut slopes and down slopes will be materially flattened and rounded. Slopes as flat as 1 on 4 will be an innovation on state highways. Such slopes are erosion-free and readily adapted to receive a successful growth of vegetation. They permit the use of fast-moving power mowers for their maintenance. These slopes will also be rounded and blended harmoniously with the adjacent terrain.

(Concluded on next page)

SPEED OPERATION for Snow Plows and Road Machinery with the . . .

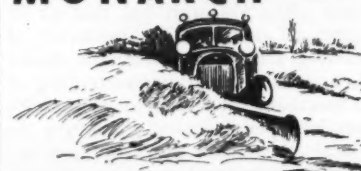
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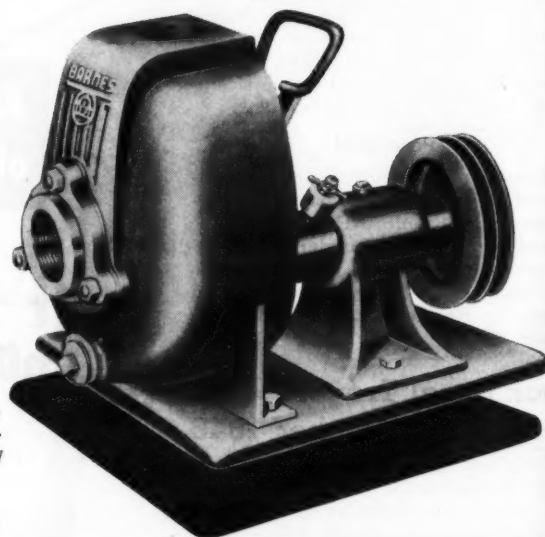
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Barnes' NEW UNIVERSAL DRIVE 1 1/2-inch Automatic Centrifugal Pump

Tired of waiting for "post-war marvels"? There's no need now to wait longer if the marvel you want is an economical, dependable pump adaptable to any power source.

The brand-new Barnes 3MU Pump is slick as a whistle and is as handy as the pocket in a shirt for contractors, industrial plants, municipalities, farmers and gardeners or wherever the operator's own power source is available. It will deliver top performance when belt driven or operated directly from shaft coupling. It delivers up to 5700 gallons an hour with pressures up to 35 pounds per square inch. This new Centrifugal Pump has the same Automatic Prime, Barnes Super-seal, Direct Flow Suction, Non-Clogging Impeller and all other fine features found in Barnes' famous "33,000 for 1" Pumps.

These advantages plus easy portability (35 lbs.) open hundreds of new uses for these rugged, economical and dependable Centrifugal Pumps. They are ready for delivery now. Order one or 100 today.



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Quality Pump Manufacturers for 50 Years

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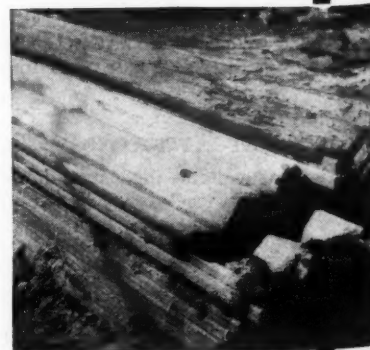
This is how costs were cut and the trenching work speeded up on an extensive sewer construction program. ARMCO Steel Sheet-piling was specified and the contractor reused it more than 100 times.

The small displacement area of ARMCO Sheet-piling makes it easy to drive—easy to pull. Corrugated design assures ample strength yet keeps weight down to facilitate handling and speed installation. In driving, sections butt together or are held securely in place by con-

tinuous interlocking joints that assure correct alignment and practical water-tightness.

You'll find other economies in ARMCO Sheet-piling, too. It is low in first cost for you buy only the exact weight you need. And since the sheeting is nestable it requires relatively little space for shipment and storage.

Write us for prices and detailed information on specific jobs. ARMCO Drainage & Metal Products, Inc., and Associated Companies, 315 Curtis Street, Middletown, Ohio.



ARMCO STEEL SHEETING



Landscaping Function To Lower Road Costs

(Continued from preceding page)

The day of railroad-embankment slopes where a template was scored across the landscape is a past fashion. These are to be superseded by slope gradients constantly revised and adapted to the existing soils and topography.

Roadside Planting

It is a known fact that in time Nature will introduce growth if the soil itself is stable. To speed up these natural processes, much stress is now placed on planting a vegetative cover on all exposed earth surfaces. Landscape contractors will follow closely on the heels of construction, with the least possible interval of time during which surface soil erosion could occur. Usable top layers of soil will be salvaged for use as topsoils. Clays, sands, and mucks will be salvaged and incorporated into raw soils to attain the desirable physical qualities for plant growth. The kinds of grasses, legumes, vines, and shrubs will be selected for adaptation to the soils, local moisture conditions, climate, and the exposures of the site. Fertilizers and lime will be added as required to stimulate and sustain this growth.

Mulching is advocated, not as a cure-all, but in recognition of the many benefits which it provides. It lessens surface erosion, adds organic matter, conserves surface moisture for the new roots, prevents alternate freezing and thawing, reduces weed growth between newly planted shrubs and vines, and fosters the growth of new seedlings. It is thus considered a requisite with all seeding and planting operations.

Such innovations in the standards of highway construction result in new contract specifications for roadside development. Formerly, there has been a standard which specified the same kinds of grasses for the sand dunes of Long Island, the clays of the Mohawk Valley, and the crest of Whiteface Mountain. Henceforth individual specifications will be designed for each project. If necessary, they will be designed for different parts of each project if conditions warrant a special material or a different method of construction. Standard specifications for landscape developments are overboard. The new specifications are functionally designed.

New Tools and Methods

These specifications, in turn, invite the use of new tools for shaping the ground forms, for spreading fertilizer and seed, and for mulching. The Department is now developing tools for fertilizing plants by the use of water pressure. Other tools use water or wind pressure to spread fertilizers, seeds, mulching materials, and even small amounts of topsoil. The ingenuity of the contractors' engineers will undoubtedly devise tools which will effectively and economically carry out other horticultural processes.

Horticultural processes are also in a state of flux. It is likely that the use of pregerminated dwarf grasses sprayed on earth surfaces like so much paint will soon be an established practice. It will be accomplished in one or two passes of a machine running on the pavement and reaching slopes 60 feet away. Growth will be spontaneous.

To be in keeping with the modern highway it is time for modern materials, modern tools, and modern methods to replace the horse-drawn cultivator.

Objectives of Program

New York State is confident that by adapting man's methods to Nature's plan, and by speeding Nature's processes, a protective veneer of vegetation on all raw soils can be successfully

formed. It intends these healed and luxuriant roadsides to become a fitting foreground for the latent beauty and interest of its natural landscapes. Such a foreground development will be useful. It will add safety to the roadsides. It will constitute a considerable degree of pleasure for the motoring public. And furthermore, it will be more economical to create and to maintain.

Vibrating-Screen Data

In Illustrated Catalog

To help in the selection of Seco vibrating screens, the Screen Equipment Co., Inc., has issued a catalog called "A Guide to Better Screening".

The material in it is classified wher-

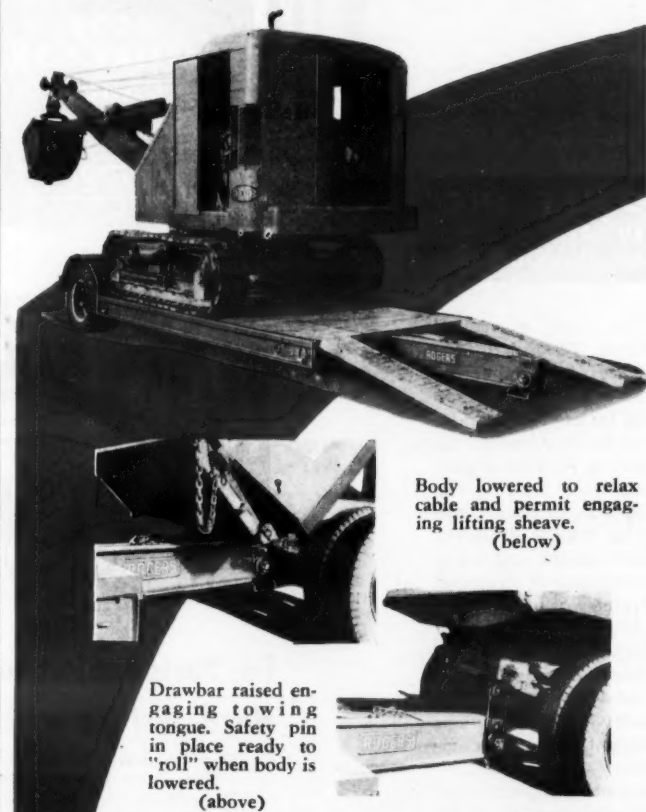
ever possible under headings that correspond to the major types of uses, such as crushed stone, sand and gravel, etc., so that readers can find quickly the information most relevant to their particular operations. Photographs and diagrams of the various models of screens illustrate the catalog. Instructions for installation and care are included. Special features claimed by Seco for its vibrating screens are detailed, such as the patented equalizer assembly said to keep all of the vibration in the live body.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain copies of this catalog at no charge, by writing to the manufacturer at 9 Lafayette Ave., Buffalo 13, N. Y. Mention this item.

Nickel-Silver Rods

Two new nickel-silver welding rods have been added to the All-State Welding Alloys Co. line of low-temperature welding and brazing alloys and fluxes. One of these rods is recommended for production and fabrication of light-steel and nickel-alloy sections, and is said to be suitable for low-temperature welding of steel, stainless steel, copper nickel, and nickel. The other is recommended wherever resistance to frictional wear is desired and especially for work on worn or broken parts.

It has been announced from the company's offices at 96 W. Post Road, White Plains, N. Y., that stocks are sufficient for immediate deliveries.



Body lowered to relax cable and permit engaging lifting sheave. (below)

Drawbar raised engaging towing tongue. Safety pin in place ready to "roll" when body is lowered. (above)

TAGALONG FRONTLOADER, available in 10 and 20 ton capacity sizes, is an appropriate name for this new Rogers Trailer especially designed to haul small and medium equipment and be towed by a dump truck.

Equipment is loaded from the front—the dump body elevated to relax cable and engage sheave—then lowered to raise the drawbar which inserts towing tongue into drawbar.

With safety pin in place the trailer "tags along" at truck speed, getting equipment to and from jobs without delay—more quickly—and at a new low cost.

Write for information or mail the coupon below for extra prompt service.

The large catalog describing the general line of Rogers Trailers will also be mailed on request. Ask for it.

ROGERS BROTHERS CORPORATION
108 ORCHARD ST. • ALBION, PENNA.



EXPERIENCE
builds 'em

PERFORMANCE
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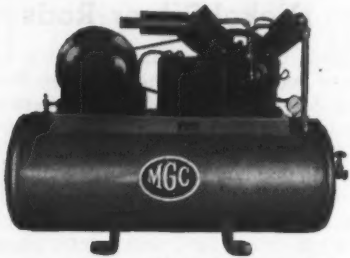
Heavy duty trailers available in all sizes for all purposes.

For Complete Information Quickly mail this coupon

Rogers Bros. Corp., 108 Orchard St., Albion, Penna. Gentlemen:

Please mail me the literature checked below
☐ the Tagalong Frontloader Trailer
☐ the General Catalog of Rogers Trailers

Name.....
 Address..... City.....



Here is one of the five new models of two-stage air compressors made by the Motor Generator Corp., a division of Hobart Bros.

New Air Compressors

Five new models of 2-stage air compressors are being announced by Motor Generator Corp., a division of The Hobart Brothers Co., Hobart Square, Troy, Ohio. These compressors will be available in 7, 9, 13, and 21-cubic-foot capacities, and all are furnished with 80-gallon storage tanks; a 60-gallon tank is optional with the 7-cubic-foot unit.

The compressors are of the self-contained type with motor and compressor mounted on a one-piece steel sub-base, which in turn is electrically welded to an 80-gallon horizontal air receiver. They are fully automatic and controlled by centrifugal-type unloading valves which are said to guarantee against

motor burn-out.

Power transmission is direct from the heavy-duty motor by multiple V-belts with slack take-up provided. The air pressure is automatically controlled, the pressure-switch contacts closing at minimum air requirement and opening at maximum air requirement.

Further information about the line may be obtained by writing to the manufacturer, and mentioning **CONTRACTORS AND ENGINEERS MONTHLY**.

Data on Feeders, Bins

The Badger line of portable and stationary feeders and hoppers is described in a bulletin just issued by the Wisconsin Foundry & Machine Co. Three types of portable feeders are listed: the reciprocating plate feeder, the belt feeder, and the apron feeder. Also covered in the bulletin are the Badger steel pit hopper for loading portable conveyors and the all-steel bins. The company makes gravel bins in the following sizes: 5, 12, 16, 21, and 25 cubic yards.

The final page of the bulletin is devoted to the 21-yard all-steel bin, suitable for use with sand, cement, or other materials that have a tendency to stick to the sides of the hopper. Copies of the bulletin are available. Write to the firm at 620 Railroad St., Madison 1, Wis., and refer to this item.

Kentucky Road Dept. Shift

William R. Milward, III, of Lexington, for the past three years Supervisor of Personnel for the Kentucky Department of Highways, has resigned to enter private business.

Mr. Milward is succeeded by Victor E. Comley, Nicholasville, who returned to the Department in December, 1946, after his discharge from the Army. Mr. Comley has been an executive in the Department's section of the Division of Purchases.

POWER PLUS! THAT'S SYNTRON



Gasoline Hammer PAVING BREAKERS

Save Time for
Your Men
Save Money for You

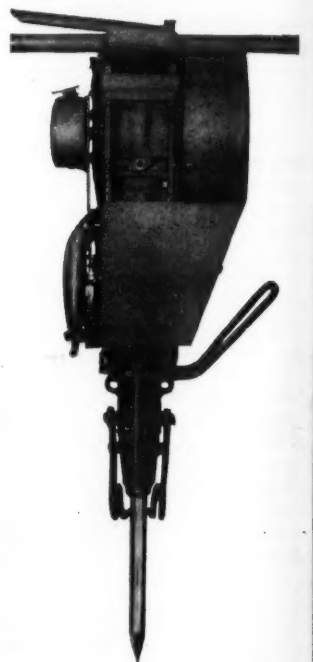
BUSTING Concrete
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(or frozen ground in winter)
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SYNTRON CO.

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HOSE
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You can quickly and profitably trowel a smooth, resilient, long-lived surfacing right over that old concrete or wood floor.

with PLASTIC ROCK!

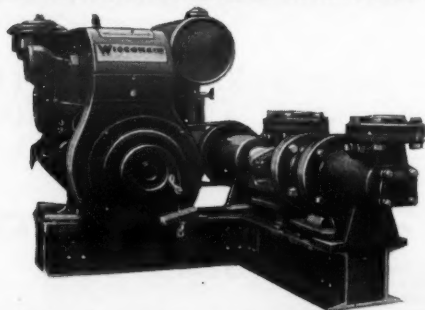
Plastic Rock comes complete, packed in barrels. Nothing more to buy. No application "formula" to confuse. Simply mix and trowel right over old floor; average depth one-half inch. Old floor Saturday is a new floor Monday. Plastic Rock is absolutely spark-proof, skid-safe even when wet, dustless, silent. Feels like cork under foot. Cannot splinter,

crack, crumble, curl or loosen. Also patches concrete to a perfect feather edge. Heavy loads on steel wheels actually improve it. Five-year-old floors show no wear. Used by largest railroads and industries in America. Over 600 contractors have found Plastic Rock a wonderful good-will builder and profit source. No special equipment needed.

Ask for comprehensive and convincing Report 220-C-1

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WISCONSIN Air-Cooled Engine Powers "Donkey Pack" Portable Pumping Unit



Typical of the many diversified applications of Wisconsin Air-Cooled Engines in engineering service is the unit here illustrated . . . designed for use in the Andes Mountains of South America, for pumping drilling mud on a geophysical shot hole drilling rig. It is so designed and constructed that it can be readily disassembled in three sections and transported by donkeys. A structural aluminum frame was used . . . and a Model AEH 4-cycle, single cylinder Wisconsin Air-Cooled Engine was selected for operating the Model B4-4 Moyno Pump . . . based on such vital considerations as light weight, extreme compactness, heavy-duty dependability and complete adaptability to trouble-free operation in any locality, at any altitude.

It pays to specify "Wisconsin Engine" for your equipment.

Most H.P. per pound **WISCONSIN MOTOR**
Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines



For Parts Subject to Impact and Abrasion Hard Surface with P&H HARMOMANG

Stop expensive delays and replacements — hard surface wearing parts of manganese and carbon steels with P&H Harmomang. It's the fast, easy way to keep equipment working longer.

You'll be amazed at the increased life given old parts — the increased protection against impact and abrasion. Weld metal deposited by Harmomang gives a hardness range up to 43-46 Rockwell C. Whether you use AC or DC machine, it will pay you to keep a stock of Harmomang electrodes on hand for building up and hard surfacing. See your P&H representative or write for information.

FREE—This handy vest-pocket electrode guide tells all about Harmomang and other P&H electrodes. Write for your copy.

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A Tournapull picks up tough-loading chunky clay during the C. T. Wilson contract to level ground for the new International Harvester plant site at Wood River, Ill.

Clay Earth-Moving Job

Some 400 acres of ground were leveled for the new International Harvester plant site at Wood River, Ill., by C. T. Wilson Contracting Co., Clayton, Mo. The firm brought in 19 Tournapulls to handle 95 per cent of the 1,450,000-yard project. The job consisted of taking approximately 10 feet off 200 acres at one end of the area to fill in 200 acres of low land.

The Tournapulls were both snatch and pusher loaded by International tractors. Cuts were wet, due to rains and river seepage, so were worked only one day at a time and then left to dry. Hauls at the beginning of the project ranged up to 3,200 feet, but were shortened to 1,500 feet as the work progressed.

Convertible Power Shovel

A 36-page catalog has just been issued by Buckeye Traction Ditcher Co., Royce and Crystal Aves., Findlay, Ohio, on the Buckeye convertible power shovel, also known as the Buckeye Clipper.

Features claimed for this unit, including vacuum power control, non-clogging crawlers, balanced weight, and fast, positive crowd, hoist, swing, and travel, are pictured and described in detail. The bulletin explains that these characteristics result in greater work capacity with lower power consumption.

Also illustrated and described is the convertibility from a power shovel to trench hoe, and to crane with dragline, clamshell, hook block, or magnet, and to pile driver. The maker's truck crane and high-lift shovels are also pictured

New Heavy-Duty Tire

Announcement of a complete new line of truck tires to be known as the Road Lug, designed and developed for combination off-the-road and highway service, has been made by The Goodyear Tire & Rubber Co., Akron, Ohio.

According to the manufacturer, the Road Lug tire is particularly suitable for use under conditions where heavy loads must be brought out on rocky, rutty, or stump-obstructed roads to surfaced highways for long hauls. It is claimed that the Road Lug is designed to resist cutting and bruising, provide traction in soggy going, and deliver exceptional mileage on improved highways.

Production of the Road Lug tire in sizes 7.00-20 through 12.00-24 has begun in Goodyear factories. Ultimately sizes 13.00-24 and 14.00-24 will be made available. The tires are constructed with a rayon-cord carcass, tread and side-walls with natural-rubber content equal to pre-war tires of the same size,

extra-heavy layers of cushion rubber between plies, and extra-heavy rayon breaker. All sizes have multiple beads of high-carbon-steel wire.

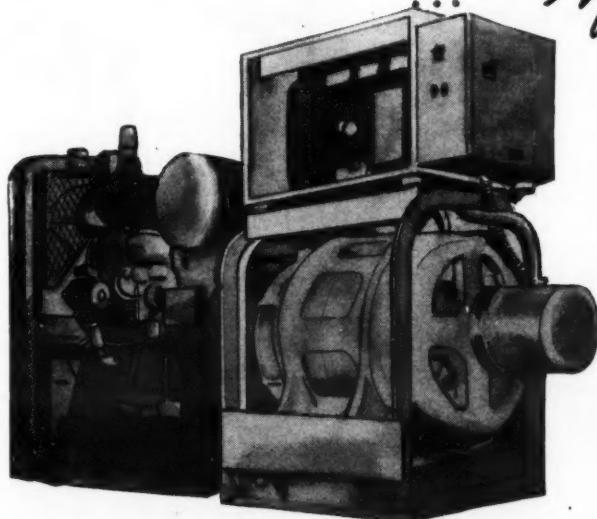
Soil-Bituminous Roads

A bulletin on soil-bituminous roads has been issued by the Highway Research Board. It is part of the "Current Road Problems" which is not intended to reflect average prevailing practice, but rather to recommend practice based on the best current information.

The booklet opens with some general definitions and explanations. It then covers soil-bitumen, sand-bitumen, waterproofed mechanical stabilization, and oiled earth surfaces. There is a bibliography of reference works dealing with this important phase of construction, and another of papers dealing entirely with test methods.

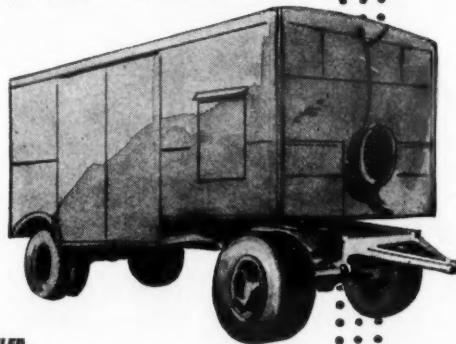
Copies of Bulletin 12 are available from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., at a charge of 25 cents.

25KVA Electric POWER UNITS *Mobile and Portable*



25 KVA PORTABLE POWER UNIT

Specifications: gasoline engine driven—AC generator—20 kw at 80% power factor—120 Volts—single phase—60 cycles—900 r.p.m.—mounted on welded steel bed plates. Dimensions: 111 1/2" long x 35" wide x 64 1/2" high. Weight: 5000 lbs. These engines are readily adaptable to operation on natural gas.



TRAILER

Features: all-metal construction—trailer adaptable as mobile office when unit is removed.

These are big, rugged, yet economical, generators designed and built for long service. They are the perfect machines for construction jobs, gas and oil drilling companies, mining companies, logging camps, in fact for all those whose lighting requirements are above the average and where consistent performance is an absolute necessity. Small motors can also be used.

For specific information on any machine, write, phone or visit the War Assets Administration Regional Office in Baltimore, Cincinnati, or San Francisco. (Trailers located in Baltimore only.)

NEW LOW PRICES

Savings as high as \$1500 and more.

Portable Units now \$1490 or less, depending on condition.

Trailer Units now \$2140 or less, depending on condition.

While some of the power units are used, all are usable without material repairs. All trailers are used.

Although this material has previously been offered to priority claimants, 10% of the merchandise has been reserved to fulfill any further needs of priority claimants including VETERANS OF WORLD WAR II, who are invited to contact the Regional Office serving their area.

This equipment is available for export. Any question on export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

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Surface Treatment With Tar and Sand

Rambling Road Crew Moves Camp Every Few Weeks on State Maintenance Work; Averages 20 Miles Weekly

♦ TO keep its highway system in good shape, Maine employs as many as 23 maintenance crews. They travel the length and breadth of the Pine Tree State every year to overhaul roads in need of attention. These crews are mechanized mobile units which move with their equipment from town to town. They establish headquarters in a different location for a stop of from one to five weeks, depending on the road mileage that can be efficiently covered from that site.

They are self-sufficient units. For besides bringing their tools and equipment with them, they carry three tents in which the crew sleeps, and a rolling kitchen where all meals are prepared and served. As most of Maine's highways have a bituminous-treated surface course on a gravel base, the bulk of the State's maintenance program each year is surface-treating these roads with tar and sand.

Such a typical operation by a typical crew was visited last summer by one of the editors of *CONTRACTORS AND ENGINEERS MONTHLY*. The unit had shortly before pitched camp at the intersection of State Routes 5 and 35 in the town of Albany in the western part of the state. Tourists traveling through that part of Maine were attracted by the neat encampment of workers with the white tents, the rolling "chuck" wagon, and the small portable cabin for the maintenance foreman and his wife. This cabin is quickly dismantled and loaded on a truck when the crew breaks camp. Tourists were also interested by a road sign at that point. Its arrows point to nine foreign places which, none the less, are all names of near-by Maine villages. In one direction Paris is only 15 miles away; 94 miles in an opposite direction is China.

Out on the roads radiating from the camp the crew was busy with surface-treating operations. Prior to its coming, the State District Supervisor, who has

under his direction about 500 miles of roads spread out over 16 towns, with his patrolmen and a pulled grader and truck for equipment, had trimmed the edges of the road and cut off any high spots or berms along the shoulders. This small force, which is permanently stationed in the district, also roughly leveled the surface of the road and reshaped the shoulders and ditches where necessary. Thus when the rambling state-wide crew moved in, the road was ready for the surface treatment.

Surface Treatment

In this particular area the tar for the work was supplied by Koppers Co., Inc., which delivered it in tank cars to a siding of the Grand Trunk railway at Bethel, about 14 miles from the camp. It was then transferred to the two distributors used in the surface treating, a Kinney 1,000-gallon and a shop-made 1,200-gallon unit, both mounted on Ford trucks. The temperature of the tar averaged 120 degrees F, since the trip in the insulated tank cars from Portland was only a little more than 60 miles. The pumps on the distributors were used in filling their own tanks, and the temperature was maintained with the distributor torches until the tar was applied on the road.

Since traffic was maintained on the 18-foot roads, the distributors used 9-foot spray bars to apply the bitumen half width at a time. They applied it at varying quantities per square yard, with an average consumption of 2,200 gallons of tar for one mile of full-width surfacing.

The tar was covered at once with sand, spread by from six to eight trucks equipped with spreaders built in the state shop. The trucks are rented by the hour with a driver furnished, and are picked up in the locality where the maintenance work is being carried on. The sand spreaders are 24-inch disk affairs mounted on 2 rubber-tired wheels. They are part of the crew's equipment and are fastened at the rear of the trucks. The trucks move in forward gear over the tar, while the sand is pushed out through a hole in the tailgate onto the revolving disk which scat-

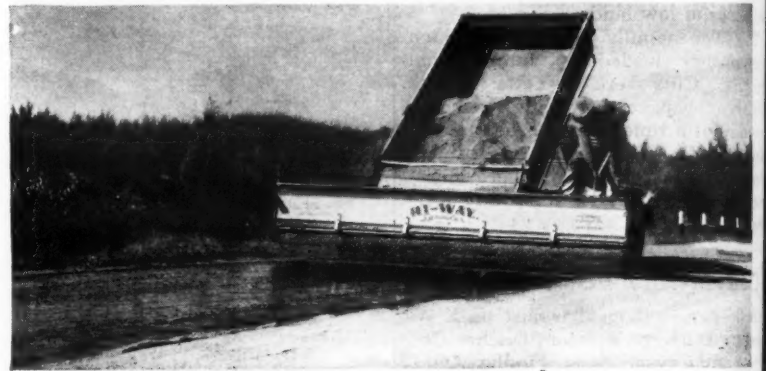


C. & E. M. Photo
Underbody blades on this Oshkosh truck mix a tar-sand mulch during state-highway maintenance operations in Maine.

ters it over the 9-foot width of tar. The bodies of the trucks are tilted slightly to permit the flow of sand towards the rear; this movement is helped by hav-

ing a man on each truck to shovel the sand along to the exit. Between 75 and 80 cubic yards of sand are used to cover

(Continued on next page)



EASIER OPERATION . . . FASTER. MORE PROFITABLE SPREADING WITH HIGHWAY SPREADERS

The Hi-Way Model R Material Spreader with REVERSIBLE Transmission

Put more profits into your pockets by saving time and material. Shift one lever and you can operate the Model R Spreader forward or backwards to suit the job. Spiral feed roller and agitator-conveyor have reversible transmissions assuring positive action and steady flow of material regardless of direction. Feed gate adjustment controls thickness of spread. Width can be adjusted from one foot to full width of spreader. Entire unit is balanced for easy hook-up to truck. Swivel type self-coupling hitch allows traction wheels to remain in constant contact with ground... assures even distribution on any job. Hi-Way Model R Material Spreaders are available in 8, 9, 10, 11, 12, and 13 foot widths. Write for complete details.

Spreading is a ONE MAN job with the HIGHWAY MODEL DD



This remarkable spreader clamps onto tailgate of any dump truck. Permits one man to cast a uniform spread 8 to 60 feet wide at truck speeds up to 35 miles per hour. The DD casts material close to ground under and ahead of rear wheels of truck. It is equipped with adjustable feed gates controlling thickness and direction of spread, and throttle on 1½ H.P. Briggs & Stratton gasoline engine to control width. Material feeds into hopper by gravity—no shoveling required. The Model DD is widely used for low cost seal coat work, for spreading calcium chloride on gravel and dirt roads for dust control in summer, and for spreading sand and cinders on highways, streets, and airports for ice control in winter. Write for specifications.

HIGHWAY EQUIPMENT COMPANY, INC.

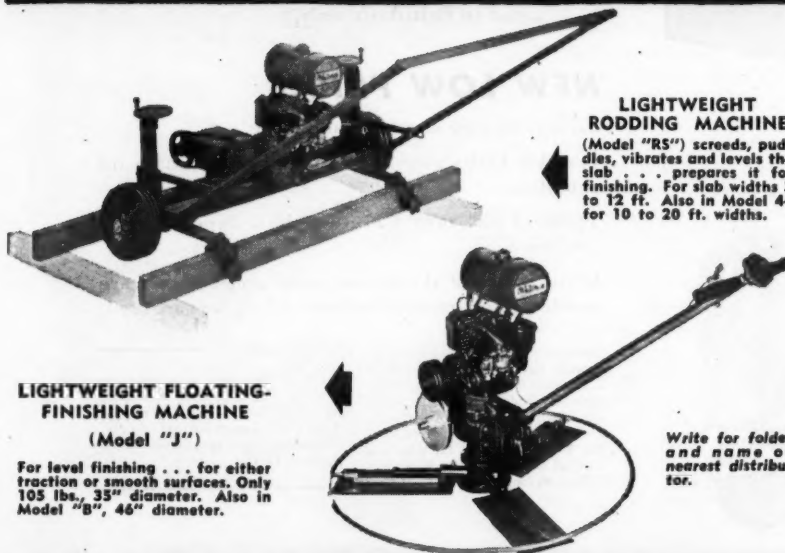
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(Model "RS") screeds, puddles, vibrates and levels the slab . . . prepares it for finishing. For slab widths 3 to 12 ft. Also in Model 44 for 10 to 20 ft. widths.

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MACHINE**
(Model "J")

For level finishing . . . for either traction or smooth surfaces. Only 105 lbs., 33" diameter. Also in Model "B", 46" diameter.

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EQUIPMENT**
WHITEMAN MFG. CO.
3249 Casitas Ave., Los Angeles 26, California

Surface Treatment With Tar and Sand

(Continued from preceding page)

one mile of full-width tarring.

The sand for the cover coat is purchased from pits in the locality, but is excavated and loaded to the trucks by the state crew. In this particular area a Link-Belt Speeder ½-yard shovel worked in a pit at Stoneham, which is centrally located to all the roads which were being improved. The shovels, as in this case, are usually state-owned and assigned to a district. Arrangements for the use of a shovel and adequate pits for the sand are made before these operations are scheduled to begin.

Following behind the sand spreaders is an Oshkosh truck equipped with underbody blades which mix the tar and sand into a mulch. The blades are vertical, 8 inches deep. They are arranged in three pairs of two each from front to back, with their apex pointing forward. There is another row at the rear set at right angles to the side of the road. The diagonally pointed forward blades in front mix the sand and tar; the wide straight blade at the rear levels the material. The 8-ton truck makes at least four passes over the surface in hot weather, and eight passes in cold weather to assure that the ingredients are properly mixed. This mixing also consolidates the mulch and flattens it out. No rollers are used. After traffic has been over the road, the new tread has been reduced to a thickness of from ¼ to ½ inch.

After one side of the road is com-

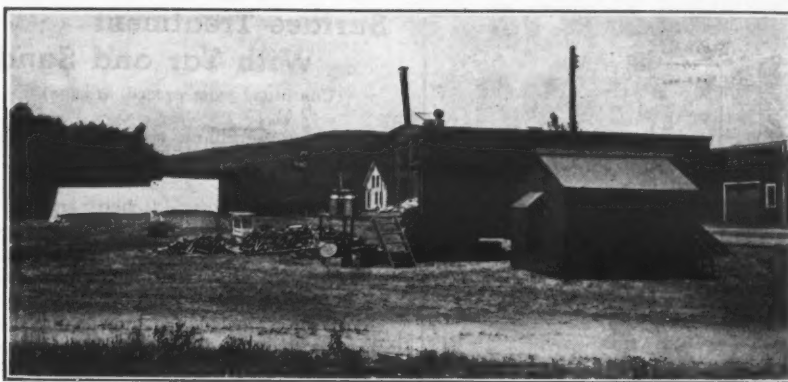
pleted the same procedure is followed on the other half. When finished, if any tar appears to be "bleeding" through the sand, more sand is spread on by the trucks to absorb the surplus bitumen.

Supplies and Personnel

Before the mechanical sand spreaders came into use, this maintenance crew numbered 28. The force has been reduced to 13 with the speedier and more convenient method of applying sand by the spinning disks. The crew averages 20 miles of 18-foot surface treatment a week, working six 8-hour days. The personnel includes: a maintenance foreman; a sub-foreman who operates the controls on the distributor; a shovel operator; 2 on the underbody-blade truck, a driver and a man at the rear to regulate the blades; 4 sanders; 2 drivers for distributor trucks; a driver for the pick-up truck; and a cook. The pick-up truck is an International and is used for all-around work and hauling men and tools. A contract was made with the Texas Co. to furnish the crew with gasoline wherever it might chance to be, while the American Oil Co. supplied the oil and greases.

The 23 maintenance crews in the state are usually assigned to certain areas but may be sent anywhere if necessary. They generally hit the road around May 15, but this time varies considerably with the weather. Sometimes they are out as early as March. In 1946, because of spring rains, the crews did not get going until June. Operations wind up, as a rule, around the first of November. Camp sites may be occupied anywhere from one to five weeks.

These camp sites are hired by the State, and the drinking water the men



C. & E. M. Photo

Maine tourists were attracted by this neat camp of a state maintenance crew. At left are the three crew tents; center, the "chuck" wagon; right, the foreman's cabin.

are going to use is first analyzed in the state laboratory and approved before the camp is pitched. Canned goods and non-perishable staple foods and groceries are purchased through the Highway Commission at Augusta, and the rolling kitchen is well stocked before

starting out. Perishable goods, including meats, vegetables, fruit, milk, etc., are bought along the way, usually from wholesalers. These items are all purchased through emergency work orders, since the foreman handles no cash di-

(Concluded on next page, Col. 2)

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"Junior! Do you know anything about an order for a snow plow?"

Fifth-Wheel Design Said to Remove Play

The No-Slack fifth wheel, designed to eliminate all play between truck and trailer, is being manufactured by the Fontaine Truck Equipment Co.

The new and improved Model 544 is a 36-inch semi-automatic heavy-duty fifth wheel. It weighs 277 pounds, less mounting plate, and has a capacity of 60,000 pounds (suitable for 120,000-pound-capacity trailer), according to the manufacturer. The wheel works on a wedge principle, in such a way that the pull of the load on the kingpin will tend to tighten the wedge-type jaws, rather than to open them.

The No-Slack fifth wheels are fabricated of steel plate and carry a guarantee not to crack or break under any load. The surface plate is $\frac{3}{8}$ inch thick, and the entire 36-inch surface bears against the upper fifth-wheel plate.

Complete details may be obtained by sending a card to the company headquarters, P. O. Box 1591, 3827 First Ave., North, Birmingham, Ala., and referring to this notice.

Surface Treatment With Tar and Sand

(Continued from preceding page)

rectly; the merchants redeem the work orders through the central highway office at Augusta.

The big trailer kitchen is well equipped with icebox, cook stove, tables, and benches, the latter also serving as lockers for the storage of food. The regular employees of the crew eat all their meals there and sleep in the three tents pitched near-by. The drivers of the sand trucks, who are hired locally, neither eat nor sleep at the camp. Members of the regular crew are paid an hourly rate for the number of hours worked and are also given their meals. Cooking is done by the foreman's wife, who travels with the crew.

For the work described here, which took place in the town of Albany, Maurice Clifford is Maintenance Foreman in charge of the road crew, and C. R. Files is District Supervisor, with headquarters at East Stoneham. Lucius D. Barrows is Chief Engineer for the Maine State Highway Commission, while John B. Church is Superintendent of Maintenance, assisted by J. W. Dority.

Catalog on High-Strength Corrosion-Resistant Steel

Complete data on properties, fabrication, and application of the high-strength steel known as Cor-Ten are presented in a 68-page booklet issued by the United States Steel Corp. subsidiaries. Cor-Ten is a chromium-nickel-silicon-copper-phosphorus type of steel. Features claimed for it are good workability, weldability, and resistance to abrasion, impact, and fatigue.

The first section of the book discusses the various properties of the steel, in-

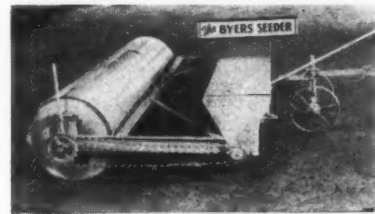
cluding its high resistance to atmospheric corrosion, and outlines how they may be used to best advantage.

The rest of the book deals with the applications of Cor-Ten in various fields. It includes full data on fabrication by standard practices, and has five pages devoted to welding procedures.

Test data, lists of equipment and users together with photographs and charts are used to illustrate and back up the claims made for Cor-Ten.

Copies of this new booklet may be secured from the United States Steel Corp. Subsidiaries, 901 Carnegie Bldg. Pittsburgh 19, Pa.

THE BYERS SEEDER



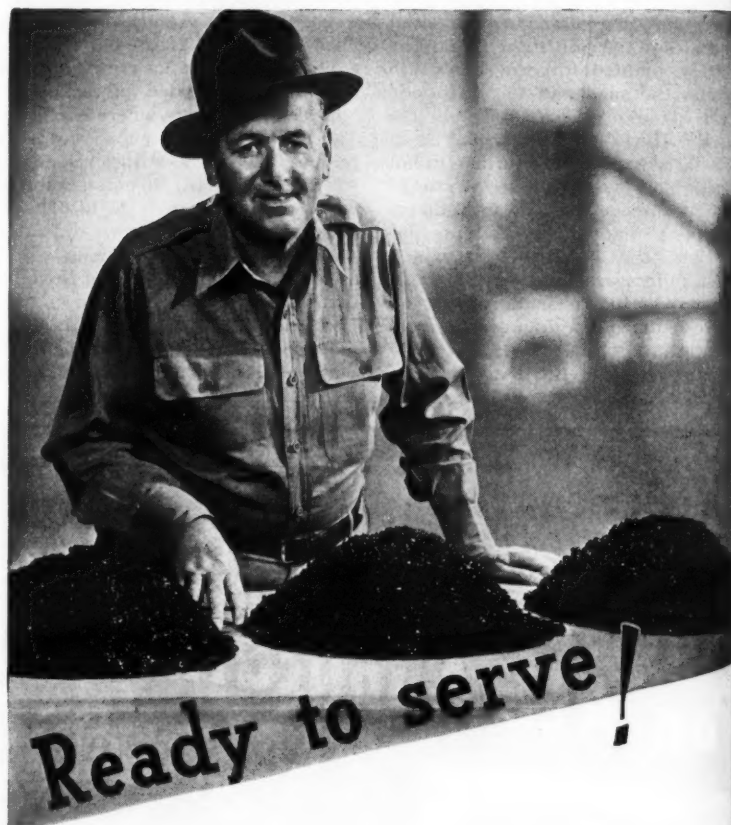
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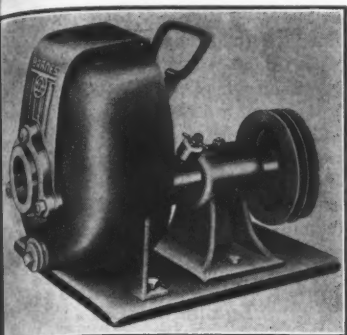
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Street

City

Zone

State



The Barnes 3M-U 1½-inch automatic centrifugal pump is adaptable to any type of power pressure.

Portable Water Pump

A portable centrifugal pump weighing 35 pounds is now being made by the Barnes Mfg. Co. It can be adapted to any type of power source, the manufacturer says; it is convertible for either belt drive by use of pulleys or direct drive by means of a shaft coupling. It is said to have a capacity of 5,700 gph, with pressure up to 35 psi.

The Barnes 1½-inch universal-drive automatic centrifugal pumps are recommended by the manufacturer for unwatering small excavations, pumping out manholes, and similar jobs. Features are said to include automatic prime, direct-flow suction, non-clogging impellers, no water detours, and Barnes superseal.

Write to the manufacturer for further information at Main and Hout Sts., Mansfield, Ohio.

Pit and Pitless Scales

When buying a scale, it is important to have concise information as to capacity, platform dimensions, and type to fit your particular need. This and other pertinent information is contained in a 46-page bulletin issued by the American Scale Co., Kansas City, Mo., maker of both pit and pitless scales. The bulletin lists the advantages of both types but recommends the portable pitless type for most contractors.

The American Scale Co. engineers point out that rated capacity is not the only factor to be considered in purchasing a scale. With modern trucks, the weight is not always evenly divided between front and rear wheels; therefore, it is important to consider the maximum weight for each wheel load. The catalog classifies scales to help purchasers with these considerations. It also gives a complete description, along with cutaway drawings, of most of the scales in the company's line, which ranges from 5 tons to 50 tons. Copies of Catalog 546 may be obtained from the company's offices at 919 Baltimore Ave.

Amsco Staff Appointments

The American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill., announces three major appointments: A. R. Sittig as manager of manganese-steel sales, with

offices at Chicago Heights; E. L. Quinn as Assistant Vice President in charge of welding products, also with offices at Chicago Heights; and E. J. Nist as Assistant Vice President with offices at 230 Park Ave., New York City.

These men have been with Amsco for many years and are well known in the field, having long been associated with the selling of manganese-steel parts and welding products.

Hose-Coupling Manual

A pocket-sized handbook and service manual on the use of hose couplings and fittings has recently been issued by Hose Accessories Co. The booklet has been planned to aid the users of hose and hose couplings to reduce the operating costs and increase the efficiency of their equipment. Included is information on the care of hose, the selection and installation of the correct hose couplings for various types of equip-

ment, and other useful data.

Copies of this 20-page manual may be obtained by writing to the company at 2702 V No. 17th St., Philadelphia 32, Pa.

Highway Engineering Conference Proceedings

The proceedings of the seventh annual Utah Highway Engineering Conference have been issued in book form by the University of Utah, at Salt Lake City. The booklet, compiled and edited by Professor A. Diefendorf, is Bulletin 32 of the Utah Engineering Experiment Station, Department of Civil Engineering. There is no charge for a limited number.

The speeches presented at the meetings cover a wide range of engineering subjects. These include asphalt sub-sealing, highway design standards, post-war material problems, and highway safety factors.

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HOISTED or DUMPED
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● "It's the fastest thing on wheels" say the men who are using the Brooks Load Lugger. This handy materials mover is hydraulically operated, one-man controlled, and works with any number of detachable truck bodies. Containers are loaded at ground level . . . can be hoisted, dumped, or set down bodily in 15 seconds . . . are available for all types of materials—heavy, light, liquid or dust . . . up to 8 cu. yds. and 800 gallons in capacity. Load Lugger is highly versatile . . . can handle road stone, brick, earth or riprap on one trip, concrete on the next, trash or rubbish on the next, etc., etc. With TruCrane boom extension, is quickly converted into portable crane unit. Continuous use makes one truck do the work of many. Write for catalog today.

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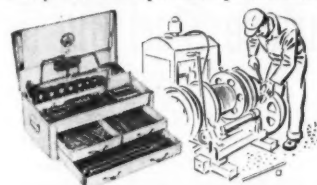


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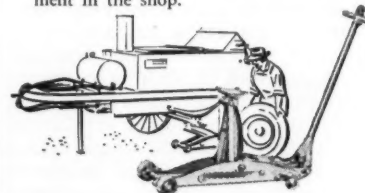
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—in a complete range—give you exclusive combinations of handles, sockets and attachments that speed work —Blackhawk Wrenches with patented thumb release "Lock-on" create extra safety and more dependable performance.

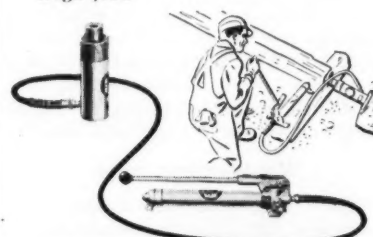


Blackhawk Hydraulic Service

Jacks — are indispensable in the shop or on the job. Sure, fast, 24" lift of the Blackhawk S4, with EXCLUSIVE features, makes it ideal for high axled machinery — and for jockeying equipment in the shop.



Porto-Power — EXCLUSIVE — is literally an all-purpose tool. It pushes, pulls, bends, clamps, presses and straightens—with tons of power. This safe, easily transported, remotely controlled hydraulic jack provides on-the-spot hydraulic power to lick 1001 tough jobs.



Blackhawk Hydraulic Jacks

—meet the demands of construction work with an unequalled "service proved" record of dependability, performance and freedom from maintenance. Powerful, fast acting, Blackhawk Jacks are real time savers on the job.



THE blistering pace of construction will require the best in fast working, modern tools. Unmatched versatility, speed and dependability of Blackhawk Products make them key tools for you. This multi-purpose equipment serves in every phase of construction and maintenance work. These modern, quality Blackhawk tools are built tough and rugged to stand the gaff. They're basic design is different, making them tops for speed and utility. For complete information on Blackhawk Products write us or see your Blackhawk Equipment Distributor. **BLACKHAWK MFG. COMPANY**, Dept. P-1817, Milwaukee 1, Wisconsin.

BLACKHAWK



C. & E. M. Photo
A Caterpillar D8 assists this Terra-Cobra with its load in a shallow cut on the Nelson, Mullen & Nelson 6-mile grading contract outside Minneapolis.

Grading and Gravel Surface Start Big Job

(Continued from page 1)

The inadequacy of the route had long been apparent to the State Highway Department. So just before the outbreak of the war, the first plans and specifications for reconstruction of the Lyndale Avenue Cut-Off south from Minneapolis for more than 40 miles were ready for bids.

Although the war delayed the work, the project was earmarked for immediate attention as soon as highway construction could again be undertaken. Early last summer, State Highway Commissioner M. J. Hoffmann opened bids on the first contract in the project. Nelson, Mullen & Nelson of Minneapolis, bidding \$220,906, was awarded 6.187 miles of grading on T. H. 165-01 at a point about halfway between Minneapolis and Faribault.

As planned by State Highway Department engineers, the completed road will have two lanes of 32 feet each, separated by an island, for opposing traffic. Although the initial contract provides only a gravel wearing course on one 32-foot width, present plans contemplate a bituminous-surfaced wearing course in the immediate future. And construction of the second traffic lane and final concrete surfacing should be completed within ten to fifteen years.

Wet-Weather Start

Nelson, Mullen & Nelson moved its equipment by truck and established a

field office in a spacious and well-appointed trailer just off the highway at the middle of the job in mid-July, 1946. It was raining as workers with two gas-powered Mall saws started work on the 20.5 acres of clearing and 17.1 acres of grubbing. And it rained intermittently as the International TD-18 and Caterpillar D8 tractors moved in to doze away the light growth and to snake out the logs.

The wet weather turned the sandy-clay soil into an adhesive grease. But it didn't keep the three Wooldridge Terra-Cobras, the three LaPlant-Choate scrapers with Caterpillar D8's, and the Heil scraper-Caterpillar D8 unit from making a good start on the 558,038 cubic yards of Class C excavation. Although long hauls of as much as a mile reduced total daily yardage, each scraper carried heaped loads. The Terra-Cobras and the LaPlant-Choate scrapers, rated at 15-yard struck measure, carried heaped loads consistently, and the Heil scraper averaged over 14 yards per load.

Cuts and Fills

Over the 6-mile job which, with new construction and reconstruction, included obliteration of 18 acres of old roadway, cuts and fills balanced rather well. The exception was a section near the center of the job where the haul was 6,295 feet. The three Terra-Cobras were used to advantage on this particular section, combining good load capacity with high speed. Typical cuts, of which there were several, ran to a maximum depth of about 18 feet and ranged in length from 700 to 1,600 feet.

Scrapers hauling the dirt were assisted in cuts by a Caterpillar D8 pusher

and sometimes, in the slippery wet dirt of fills, by the blade of one of two Caterpillar No. 12 motor graders. Fill dumped in 8-inch lifts by the scrapers, was compacted with dual sheepsfoot rollers. The graders worked on the fills, assisting in spreading and shaping the grade.

Swamp Excavation

At two sections, the new roadway lay in areas of swamp or muskeg. At one such area where muck and muskeg were encountered, a 1¼-yard Speed-crane excavated between 20,000 and 25,000 yards of this material at a depth ranging from a foot to 6 feet below the natural level of the ground. In this area, the excavated section was filled with selected material, compacted in place.

Shoulders and Ditches

The new 32-foot-wide highway has 4 to 1-foot minimum and 3 to 1-foot maximum shoulder slopes; ditches have a minimum depth of 3 feet and back-slopes are variable. The pitch of the

roadbed is ½ inch per foot. The project includes a good measure of erosion control, with 50,872 square yards of sodding and 68 acres of seeding. Sod was placed over a 4-foot strip on high fill and on inside shoulders of super-elevated curves. Topsoil to a depth of 4 inches was used to cover the ditch bottoms and cut slopes. All ditches having gradients of 2 per cent or greater were sodded. Sod placement varied from 10 to 16 feet in width.

Equipment Care

Equipment maintenance was one of the chief concerns of Nelson, Mullen & Nelson on this contract and the firm was prepared for almost any exigency from the start of work. At the location of its field office, five semi-trailers formed the nucleus of a good field-shop set-up, under the supervision of Master Mechanic Curley Winter of Minneapolis. These five semi's included a car, two parts cars, and two storage cars.

The parts cars and storage cars had (Concluded on next page)



The Model SC-200A is unquestionably the handiest, most efficient hand screed ever built and offers the widest possible scope in concrete surfacing operations such as floors, ramps, decks, platforms, sidewalks and similar construction. Also adaptable for placing concrete on short or odd sections of municipal pavement where mechanical finisher is impractical. Gives complete puddling to low-water content concrete, assuring the ultimate in wearing surface and economy of cement. Has self-propelling tendency in the forward direction. Second passes made by simply tilting and rolling back the necessary distance. Gets right up to walls. Stands upright by itself. Double handles for two-man operation; cross-bar furnished for one-man handling of screeds not longer than 9 ft. Operates on commercial power but preferably from Jackson Power Plant which provides quick change of vibratory frequency to handle wide range of concrete mix and placing conditions, assuring thorough puddling under all circumstances. Don't buy any hand screed until you have the facts concerning the JACKSON SC-200A. See your Jackson Distributor or write, NOW!

The Handiest most Efficient Hand Screed ever Built



Above: Tilted for second pass.

The self-propelling tendency makes little more than guidance necessary in the forward direction.

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.



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NONE LIKE IT . . . FOR DIRECT BLUE LINE PRINTS

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Elliott's LIN-O-BLU Ammonia developed paper should be used by you. It is a STAR PERFORMER everytime. Available in thin, medium or heavy weights. WRITE DEPT. T-7, FOR FREE SAMPLES

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C. & E. M. Photo

Here are the five semi-trailers which carried a complete field repair shop to the Lyndale Avenue Cut-Off job. At the right are two stock cars; at the left, a shop car flanked by two parts cars.

Grading and Gravel Surface Start Big Job

(Continued from preceding page)

A complete stock of replacements for tractors, scrapers, graders, and trucks. The shop car, in addition to the usual line of small repair tools, was equipped with a P&H portable welding outfit. Breakdowns, large and small, were handled at this field shop.

Another important function of Curley Winter's job was preventing and anticipating breakdowns. High on the list of preventive-maintenance "musts" was thorough and regular lubrication of all units. The equipment was serviced on the job once a day with a Graco Convoy Luber mounted on a Ford flat truck.

Another duty of Master Mechanic Winter was to keep a close eye on the steel cables of the many cable-controlled units. Nelson, Mullen & Nelson does not wait for a cable to break before splicing or replacing it. Mechanic Winter was instructed to check the $\frac{3}{8}$ -inch lift cables on the scrapers regularly and to replace them when they appeared to be worn. Cable life on the scrapers used on this dirt-moving job was effectively extended through the use of preformed wire rope, which stood up well under the severe strain of high-speed heavy operations.

Personnel

The new grade was built by Nelson, Mullen & Nelson with an average crew of 44 men working a 10-hour day shift, and 12 men working a 10-hour night shift, 6 days a week. More than 8,300 cubic yards of stabilized gravel, which furnishes the present temporary wearing course over the new grade, was placed by W. Hodgeman & Sons of Fairmont. The gravel material was laid at

the rate of 1,200 cubic yards per mile with 20 gallons of water applied per cubic yard.

General Superintendent for Nelson, Mullen & Nelson on this contract was William Hjerpe of Minneapolis. The Minnesota State Highway Department's Project Engineer was George Welch of St. Paul. C. L. Methven is Construction Engineer.

Want information on new equipment? Just send your requests to us.

Concrete Maintenance

Concrete maintenance is the subject of a recent issue of "The Trowel", a bulletin put out periodically by The Master Builders Co. for men in the construction industry. A large part of the information is presented pictorially, with a minimum of written text.

The 12-page booklet discusses the causes of concrete disintegration and how to make successful repairs. It also contains information on the following subjects: bridge maintenance, increasing the life of concrete floors, controlling shrinkage in machinery grouts, repairing hydraulic and railroad structures, protective sealing of concrete and masonry surfaces, etc. The bulletin features the use of Embeco, a metallic aggregate designed by Master Builders to control concrete shrinkage.

To obtain a free copy, write The Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio, and request Volume 1, No. 9, of "The Trowel".

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**INSURE
TRANSVERSE JOINT
MOVEMENT—
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LOAD TRANSFER DOWELS
ALIGNED BY
LACLEDE DOWEL SPACERS**

- **SHOP FABRICATED UNIT—LACLEDE WELDED DOWEL SPACERS, A SHOP-FABRICATED UNIT INSURES ACCURATE ALIGNMENT OF SHEAR DOWELS.**
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Here is a coupling of the quick-acting type that has two important *additional* features to recommend it . . . *strength* to combat the hard knocks and rough handling involved in outdoor service; *absolute safety* under extreme vibration and highest pressure surges. It is the most adaptable air hose coupling of its kind, and is completely interchangeable.

"AIR KING" Quick-Acting, Universal Type HOSE COUPLING



Made of malleable iron (cadmium plated) or brass. Shanks of hose ends are long, amply corrugated and smoothly finished, permitting easy insertion in the hose and providing a tight grip under clamp pressure. Plain design and construction—no parts to foul up or get out of order.



I.P.T. Female End

I.P.T. Male End

Locking heads are identical for all sizes of hose or threaded pipe ends, making it possible to couple any two sizes of hose, or hose and pipe, of "Air King" dimensions, without adapters, bushings or other extra fittings. Hose ends, $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ ", and 1". Pipe ends, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1".

PATENTED LOCKING ARRANGEMENT. A cotter pin, nail or wire inserted through holes in flanges on locking heads, after connection is made, will prevent the coupling from coming apart regardless of how it is handled.

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Construction Superintendents Wanted

Construction firm with large volume of private industrial and grain elevator construction work throughout Middle West requires superintendents with experience in general and heavy construction and mechanical installations.

Mail applications, stating qualifications and experience to

Contractors and Engineers Monthly
Box 266, 1719 Daily News Building
Chicago 6, Illinois

Convention Calendar

Jan. 27-30, 1947—AGC

Annual convention, Associated General Contractors of America, Stevens Hotel, Chicago. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D. C.

Feb. 3-6, 1947—Purdue Road School

Annual program, Purdue University, Lafayette, Ind. Ben H. Petty, Professor of Highway Engineering, School of Civil Engineering and Engineering Mechanics, Purdue University.

Feb. 13-14, 1947—Roadside Development

Sixth Annual Short Course on Roadside Development, Auditorium of Ohio Department of State Bldg., 65 So. Front St., Columbus. Dallas D. Dupre, Jr., Landscape Architect, Department of Highways, Columbus 15, Ohio.

Feb. 13-15, 1947—AED

Annual meeting, Associated Equipment Distributors, Edgewater Beach Hotel, Chicago. C. F. Winchester, Executive Secretary, 1928 Eye St., N. W., Washington, D. C.

Feb. 17-20, 1947—ARBA

Annual convention, American Road Builders' Association, Palmer House, Chicago. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

Feb. 24-28, 1947—ASTM

Spring meeting, American Society for Testing Materials, Benjamin Franklin Hotel, Philadelphia. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

March 3-5, 1947—Highway Conference

Annual meeting, Highway Engineering Conference, University of Utah, Salt Lake City. A. Diefendorf, Head of the Civil Engineering Department, University of Utah, Salt Lake City 1, Utah.

March 25-28, 1947—N. Y. Safety Convention

Annual convention and exposition, Greater New York Safety Council, Hotel Pennsylvania, New York City. W. F. Brown, General Chairman of Executive Committee, 60 E. 42nd St., New York City 17.

Compensators Absorb

Motion in Pipe Lines

A bulletin containing information on its pipe-line compensators is ready for distribution by the Chicago Metal Hose Corp. Compensators are flexible-tube members designed to compensate for, or absorb motion inherent in, general pipe-line installations.

The flexible-tube pressure-carrying members of Chicago Metal Hose compensators are one-piece and all-metal; they are manufactured in a range of diameters to serve a variety of pressure and motion requirements. They allow

for motion in multiple planes as well as axial motion. The radial motion which they provide for in all planes is said to afford a wide latitude of installation uses.

In addition to an explanation of compensators and data on their specifications, the new bulletin presents diagrams of typical installations. It covers working pressures and standard end fittings. It also contains helpful information for those working with piping which is subject to corrosion, expansion, temperature, deflection, movement, vibration, etc.

To obtain this information, write to the manufacturer at 1311 So. Third Ave., Maywood, Ill., requesting Bulletin COM-1. Just mention this item.

List of Steps Required To Obtain Airport Aid

The steps an airport sponsor must take to participate in the Federal-Aid airport program have been outlined in a booklet issued by the American Road Builders' Association. The booklet was written by W. R. Macatee, Manager of the Association's Airport Division. It includes a digest of CAA's proposed Rules and Regulations.

The booklet is obtainable by writing to the Association at 1319 F St., N. W., Washington 4, D. C. Request bulletin No. 114, 1946.

Crawler-Tractor Catalog

Recently released is a 32-page catalog on the HD-14 diesel crawler tractor, made by the Allis-Chalmers Mfg. Co. Photos of the tractor in action plus cutaway views of important parts are distributed throughout the booklet. Accounts are presented of the pusher technique, 2-cycle diesel power, grease-packed truck wheels, 4-way cooling, and track design.

Special pages are devoted to allied equipment, auxiliary attachments, and specifications. These last account for such items as the HD-14's 132 drawbar horsepower, its six speeds forward and two reverse, engine data, general tractor dimensions, steering details, and fuel capacities.

Catalog MS-248A is available to readers of CONTRACTORS AND ENGINEERS MONTHLY who mention this report when they write and specify the catalog form number. Address requests to Tractor Division, Box 512, Milwaukee 1, Wis.

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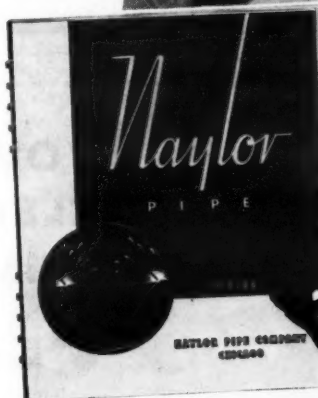
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A Highway-Transport

Program Is Outlined

Some solutions for highway transportation problems are outlined in a booklet issued by the National Highway Users Conference. It is entitled "A Positive Program for Highway Transportation". It presents the problem, then states what the NHUC feels is the solution by direct means.

The major issues on which programs are offered are: (1) sound and adequate construction of highways based on actual need; (2) increased necessity for highway safety education and law enforcement; (3) continuation of the present Federal-Aid program for state-owned highways; (4) repeal of present Federal automotive excise-tax laws and the safeguarding of highway funds for highway purposes; (5) simplification of present restrictive regulations hampering motor-vehicle operation; (6) increased reciprocal agreements among the states; and (7) immediate legislation to ensure liberalization of present vehicle size and weight restrictions on a sound basis.

In addition, the booklet tells about the scope and purposes of the National Highway Users Conference, a public-interest organization representing highway-user groups. To secure the booklet, write to the NHUC at the National Press Bldg., Washington 4, D. C.

Portable Power Plant

A new portable power plant, suitable for use in the operation of small appliances and for charging all types of storage batteries, has been announced by the Pioneer Gen-E-Motor Corp. The Gold Crown Model BA-6 weighs 145 pounds and delivers 600-watt continuous service. It is a combination 115-volt ac 60-cycle unit and 12-volt 100-watt dc plant. The Pincor power plants are available in sizes up to 15 kw.

Further information can be obtained by mentioning this notice when you write to the firm at 5841-49 Dickens Ave., Chicago 39, Ill.

Line of Hauling Scrapers

A line of dirt-moving scrapers ranging in capacity from 3 to 12 yards is described in a catalog issued by The Shusser-McLean Scraper Co., manufacturer of the Mammoth scrapers. The sizes available are 3, 5, 6, 8, 10, and 12

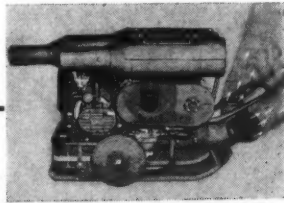
yards.

The depth of cut with these scrapers can be adjusted to within a fraction of an inch; the manufacturer says; also, the rear wheels of the scraper travel in the cut made by the blade, thereby facilitating uniformly level cuts. Other features of the Mammoth scrapers are the double-cable control, which is available to fit most track-type tractors, and a wide shallow bowl.

The last page of the catalog gives complete specifications and working details for each of the six models. It is free for the asking if you write to the company at Sidney, Ohio.

Traffic-Density Increase

Traffic density on New York state highways increased by 64 per cent during the first year after the removal of gasoline rationing. In spite of this increase in traffic flow, however, the number of cars operating on the highways of the state is still far short of the 1941 pre-war high mark.



PORTABLE HEATER SALE

STEWART-WARNER portable powerful 100,000 BTU gasoline-burning Heaters complete with turbine type blower and 1 1/2 hp. air-cooled ball-bearing engine.

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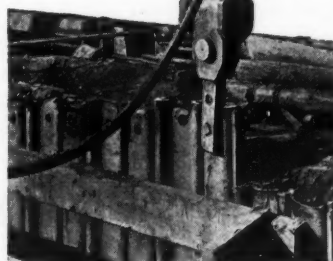
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Contractors *and* Engineers Monthly

TOURNAPULL JOBS prove lowest-net-cost-per-yard

HAUL one way	TRIPS per hour	Name of Owner	Job Location	Type of Material	Job Conditions
120' to 200'	15	Triple Cities Construction Corp., Binghamton, N. Y.	3 Tournapulls on 350,000 yd. relocation of Hwy. 16 between Chaffee and Holland, N. Y.	Blue gumbo, wet clay and quicksand.	Wet cuts, tough materials and steep hills.
150' (1000' cycle)	12	Wheeling Engineering & Equipment Corp., Cleveland, Ohio.	2 Tournapulls on 200,000 yd. channel change and new R.R. grade for W.&L.E.; 3 mile stretch between Dillonvale and Rayland, Ohio.	Gravel, muck, stone, quicksand, mud and topsoil.	Often hub deep in sand and muck. 150' of 20% up grade on haul.
200' to 300'	13	Meltz-Spears-Dehner Co., Fort Wayne, Ind.	3 Tournapulls on 300,000 yd. realignment of Hwy. 120 north of Shipshewana, Ind.	Loose sand and gravel.	Hilly, loose sand and gravel haul roads through swamp. Winter.
300'	21	J. C. O'Connor & Sons, Inc., Fort Wayne, Ind.	4 Tournapulls leveling 300' x 500' factory site at Ft. Wayne, Ind.	Dry sod.	Dry materials, normal conditions.
500'	14.5	Illinois Valley Construction Co., Ottawa, Ill.	4 Tournapulls on 265,000 yd. grading 4.85 miles of U. S. 24 from Clifton Hill to Salisbury, Mo.	Sticky clay.	Wet and slippery, heavy rains.
525'	11	Talbott & Myers Construction Co., Winchester, Ky.	2 Tournapulls excavate 45,000 yds. for new General Electric factory at Lexington, Ky.	Soggy clay.	Several weeks of rain. Winter.
550'	12	R. C. Micotto, Contractor, St. Louis, Mo.	2 Tournapulls landleveling 125,000 yd. subdivision near St. Louis, Mo.	Heavy yellow clay.	Normal mid-west dirtmoving job.
600'	17	Augustine Construction Co., Philadelphia, Pa.	2 Tournapulls building 250,000 yd., 50' dike for Queens Lane Reservoir, Philadelphia, Pa.	Dirt, rooted rock, mica, clay, sand.	Haul up 17% grade to dike. Snow, rain and sleet.
700'	14	Potts & Callahan Contracting Co., Inc., Baltimore, Md.	4 Tournapulls on 1,200,000 yd. relocation of Hwy. 22 near Harrisburg, Pa.	Shale, small % of clay.	Hard materials. Level haul.
975'	11	Cameron-Joyce of Keokuk, Ia., and O'Dell-Riney of Hannibal, Mo.	7 Tournapulls on 800,000 to 900,000 yd. Santa Fe R.R. relocation between Elmer and Cardy, Mo.	Sticky clay, hard shale.	10% grade on haul and soft fills.
1100'	11.2	Rieth-Riley Construction Co., Goshen, Ind.	3 Tournapulls grading 1300 acre, 300,000 yds. for new chemical plant site near Kalamazoo, Mich.	90% sand mixed with loam.	Loose, soft material.
1200'	7	R. W. Cleveland & Co., East Orange, N. J.	7 Tournapulls on 360,000 yd. grading for race track, Monmouth Park Jockey Club, Long Branch, N. J.	Wet and frozen clay and mud.	Rain, freeze, thaw. Material often frozen 8" deep. Haul roads a quagmire.
1350'	10	McVaugh-Haynes Co., Detroit, Mich.	10 Tournapulls on 4½ million yd. airport at Dubuque, Iowa.	Sod and black dirt.	Hilly.
1500'	11	Stanley H. Arkwright, Inc., Billings, Mont.	3 Tournapulls on 386,000 yd. relocation on U. S. 10 between Billings and Huntley, Mont.	Clay, sand, loam, gravel and blasted rock.	Several hundred foot haul over alkali bog.
1800'	11	Hesser Construction Co., Greeley, Colo.	8 Tournapulls on 1,500,000 yd. earthfilled Granby Dike north of Granby, Colo.	Clay and gravel.	Rainy. 8200' altitude. 5% down grade on haul.
2000'	10	Markham & Brown-Kearney, Crume & Co., Austin, Tex.	5 Tournapulls grade 780,000 yds. for additional facilities at Dallas Redbird Airport, Tex.	Mucky top soil, yellow clay and layer of limestone.	Stone required blasting and rooting.
2640'	6	A. Guthrie & Co., Inc., St. Paul, Minn.	9 Tournapulls on relocation of 7 miles - 2½ million yds., Northern Pacific R.R. between Glenn Ullin and New Salem, N. D.	Tough blue clay, hard scoria, seams of coal, rooted.	350' of adverse 10 to 20% grade on haul, 1200' of 7 to 8% up grade on return.
2800'	6.5	C. C. Moore Construction Co., Panama City, Fla.	3 Tournapulls on 8¼ mile, 200,000 yd. road construction into Apalachicola National Forest, Fla.	Swamp sand and muck.	"Wettest road job in Florida" through swampy jungle.
3100'	7.5	Illinois Valley Construction Co., Ottawa, Ill.	4 Tournapulls grading 4.85 miles, 265,000 yds. on U. S. 24 between Clifton Hill and Salisbury, Mo.	Sticky clay.	Wet from heavy rains, slippery.
3600'	5.8	Circle Construction Corp., White Plains, N. Y.	13 Tournapulls handling 2 million yds. of 2½ million yd. Long Island Idlewild Airport, N. Y.	Dredged ocean sand.	Saturated to extremely dry.
4200'	4	Paul Miller Construction Corp., Grand Rapids, Mich.	3 Tournapulls leveling 225,000 yd. plant site in Michigan Sand Dunes near Grand Rapids, Mich.	Abrasive, fine white sand and clay.	Tough-to-load, haul down 15%, return up 10%. Winding road.
4500'	5	Claussen-Dunn Construction Co., Augusta, Ga.	2 Tournapulls on 300,000 yd. bridge approaches and widening Hwy. 25 south of Millen, Ga.	Sand with occasional clay spots.	Heavy rains.
5280'	5.6	Keeble & Brown, San Mateo, Calif.	5 Tournapulls on 230,000 yd. fill for industrial sites in South San Francisco, Calif.	Shale and serpentine.	Up long 4% grade on return with last 300' at 15%.
6400'	3.5	A. Guthrie & Co., Inc., St. Paul, Minn.	9 Tournapulls on relocation of 7 miles, 2½ million yds., Northern Pacific R.R. between Glenn Ullin and New Salem, N. D.	Tough, blue clay, hard scoria, seams of coal, rooted.	350' of 10 to 20% adverse grade on haul, 1200' of 7 to 8% up grade on return.
11,880'	2	J. E. Milam Construction Co., Birmingham, Ala.	4 Tournapulls spreading 50,000 yd. sub-base on U. S. 11 relocation, Tuscaloosa to Cedar Cove, Ala.	Layered sand and clay.	Load down 20 to 25% grade. Hauled over sub-base fill.
15,840'	2	Raemisch-Madden Co., Middleton, Wis.	11 Tournapulls on 13 mile, 400,000 yd. grading U. S. 66, Chenoa, Ill.	Wet, pit-run gravel.	Hauled 800' from pit to road. 3 miles over old pavement.
21,120'	1	H. B. Zachry Co., San Antonio, Tex.	6 Tournapulls on 15,000 yd. street grading in San Antonio Subdivision, Tex.	Damp, tight, pit-run gravel.	Travel through traffic over paved roads.



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